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FORECASTING TOURIST ARRIVALS IN THE RIAU ISLANDS PROVINCE FOR 2026–2027 USING MACROECONOMIC INDICATORS AND GOOGLE TRENDS DATA (2010–2024)

***Welli Braham Kurniawan[1], Fendy Kurniawan[2], Janes S Depari[3], Elisabeth Rambu Djuni Sabatudung[4]**
[1,3] Politeknik Bintan Cakrawala, Bintan, Kepulauan Riau, Email: welli@pbc.ac.id
[2,4] Akademi Pariwisata STIPARY, Yogyakarta, DIY
*(Correspondence author)

ABSTRACT

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This study To forecast tourist arrivals in the Riau Islands Province by analyzing macroeconomic and digital factors and developing a multiple linear regression-based prediction model. The research utilizes monthly time-series data from January 2015 to June 2024, covering variables such as Gross Domestic Product (GDP), inflation, Rupiah–US Dollar exchange rate, and travel interest index derived from Google Trends. The findings reveal that the developed model demonstrates high accuracy, with an Adjusted R^2 of 0.87 and a Mean Absolute Percentage Error (MAPE) of 6.85%. Partially, GDP and the Google Trends index have a positive and significant effect on tourist arrivals, while inflation and exchange rate fluctuations show a negative and significant impact. Based on the model, tourist arrivals in the Riau Islands are projected to reach 2.45 million in 2025 and 2.62 million in 2026. These results highlight the importance of maintaining economic stability and strengthening data-driven digital marketing strategies to foster the tourism sector's growth in the post-pandemic era.

Keywords: Tourism; Multiple Linear Regression; Tourist Prediction; Macroeconomics; Google Trends

INTRODUCTION

As one of Indonesia's archipelagic provinces with a strategic position bordering Singapore and Malaysia, the Riau Islands Province (Kepri) serves as one of the main gateways for international tourists entering the country. According to data from the Central Bureau of Statistics (BPS), the number of international tourist arrivals in the Riau Islands reached 126,833 visits in April 2025, representing a 1.60% decrease compared to the previous month. Meanwhile, domestic tourist arrivals increased by 16.06% compared to the same period in the previous year (BPS Riau Islands Province, 2025).

Following the COVID-19 pandemic, the tourism sector has undergone a new dynamic characterized by the increasing influence of digital engagement in shaping

travel behavior. Potential tourists now rely more heavily on online platforms to search for destinations, compare travel options, and share travel experiences through social media. This growing digital interest reflects a shift from conventional information channels to real-time digital interaction, where search engine data—such as Google Trends—captures the intensity of public curiosity and intent to travel toward specific destinations. This indicator can be measured using online search volume data from Google Trends, which has been proven to exhibit a strong correlation with actual tourism demand across various countries (Bangwayo-Skeete & Skeete, 2015; Yang, Pan, & Song, 2014). Digital platforms have also become a critical communication and recovery tool for tourism destinations during and after crises (Park & Allen, 2013). In the Indonesian context, recent studies have also demonstrated that Google Trends data can provide real-time estimations of domestic tourism demand fluctuations (Wibowo & Darmawan, 2022).

In addition to digital factors, macroeconomic conditions also play a significant role in influencing tourist mobility. Variables such as Gross Domestic Product (GDP), inflation, and exchange rates directly affect tourists' purchasing power and travel decisions (Brida, Lanzilotta, & Risso, 2015; Dogru & Bulut, 2018). When GDP increases, tourism spending tends to rise accordingly; conversely, high inflation and currency depreciation can discourage international travel demand (Garin-Muñoz, 2020).

At the provincial level—particularly in the Riau Islands—studies that integrate both macroeconomic variables and digital interest within a single quantitative predictive framework remain scarce. Most previous research has primarily focused on national-level analyses or descriptive approaches that lack robust mathematical modeling (Setiawan & Wicaksono, 2021; Ridderstaat, Croes, & Nijkamp, 2020; Athanasopoulos et al., 2022; Li, Pan, Law, & Zhang, 2021). Although these studies provide valuable insights into macro-level tourism patterns, they often overlook regional heterogeneity and the dynamic role of digital engagement in shaping local tourism demand.

This research addresses that gap by developing a predictive model specific to the Riau Islands Province, combining macroeconomic indicators and Google Trends data to forecast tourist arrivals. By emphasizing a regional-scale, data-driven approach, this study contributes to the growing body of literature on tourism demand forecasting and supports evidence-based decision-making for local governments and tourism stakeholders.

In light of this, the present study develops a multiple linear regression model that combines macroeconomic indicators and Google Trends indices to predict the number of tourist arrivals in the Riau Islands for the period 2026–2027, using historical data from 2010 to 2024. The predictive accuracy of the model is validated using the Mean Absolute Percentage Error (MAPE) to evaluate its performance against actual data.

LITERATURE REVIEW

Tourism Demand Theory

Tourism demand is determined by economic factors such as income, relative prices, and consumer preferences for leisure (Song, Witt, & Li, 2009). From a macroeconomic viewpoint, higher regional GDP signals greater purchasing power and welfare, which typically lead to higher travel expenditure and more frequent trips (Brida, Lanzilotta, & Risso, 2015). Conversely, inflation erodes real purchasing power and currency depreciation affects relative prices for inbound and outbound travel, thereby influencing international and domestic tourism flows differently (Garin-Muñoz, 2020). Consistent with this, Seetaram, Song, and Page (2014) found that income elasticity plays a decisive role in shaping inbound tourism demand. The tourism demand literature therefore establishes a direct causal logic from macroeconomic conditions (GDP, inflation, exchange rate) to tourism volumes, forming the economic backbone of the present predictive model.

Digital Consumer Behavior Theory

Digital platforms have fundamentally changed tourists' information search and decision-making processes (Buhalis & Law, 2008). Online search queries and social media interactions provide early signals of tourist interest and intent (Choi & Varian, 2012; Li, Pan, Law, & Zhang, 2021). Google Trends, as an aggregate indicator of search intensity, has been shown to improve demand forecasts and to act as a leading indicator of short-term changes in tourist arrivals (Bangwayo-Skeete & Skeete, 2015; Yang, Pan, & Song, 2014; Wibowo & Darmawan, 2022). Similarly, Gunter and Önder (2016) confirmed that Google search queries can effectively enhance short-term tourism demand forecasting at the city level. Thus, digital interest is theorized to capture the information-seeking and intention formation stages in the travel decision process, complementing macroeconomic drivers by reflecting contemporaneous demand signals.

Empirical Evidence and Gaps in the Literature

Empirical studies consistently report that macroeconomic variables and online search data improve the explanatory and predictive power of tourism demand models (Song et al., 2009; Dogru & Bulut, 2018; Bangwayo-Skeete & Skeete, 2015). Recent reviews and benchmarking studies further highlight the value of combining traditional indicators with big-data sources for more timely forecasting (Li et al., 2021; Athanasopoulos et al., 2022). However, most of this evidence is produced at the national level or focuses on cross-country comparisons; regionally focused, province-level models that explicitly integrate macroeconomic indicators with digital interest remain limited (Setiawan & Wicaksono, 2021; Ridderstaat, Croes, & Nijkamp, 2020). This omission is important because regional heterogeneity (e.g., dependence on domestic versus international markets, seasonality, event calendars) affects both the magnitude and the drivers of tourism demand. Consequently, a region-specific, data-driven forecasting model that incorporates both macroeconomic and digital signals can provide more actionable insights for local policymakers and destination managers.

Theoretical Framework and Hypotheses Linkage

The theoretical framework for this study integrates Tourism Demand Theory and Digital Consumer Behavior Theory into a unified causal model. The logic is twofold:

Macroeconomic pathway (Tourism Demand Theory): Regional economic indicators influence residents' disposable income and relative travel costs, thereby affecting the supply of travel expenditure and consequently tourist volumes. This pathway generates Hypotheses H_1–H_3:

H_1 (GDP → tourist arrivals): Higher regional GDP increases domestic purchasing power and travel propensity.

H_2 (Inflation → tourist arrivals): Higher inflation reduces real purchasing power and travel demand.

H_3 (Exchange rate → tourist arrivals): Exchange rate movements alter relative prices and cross-border travel incentives.

Information/intent pathway (Digital Consumer Behavior Theory): Online search intensity reflects tourists' attention and intent—early stages in the decision process—and serves as a leading signal for short-term demand changes. This pathway generates H_4:

H_4 (Google Trends index → tourist arrivals): Increased digital interest signals heightened intent to visit and thus precedes actual arrivals.

These two pathways operate complementarily: macroeconomic variables set the structural capacity for travel (longer-run determinants), while digital interest captures contemporaneous shifts in demand (short-run signals). The combined model thus improves predictive performance by leveraging both structural and high-frequency informational inputs. The final predictive hypothesis (H_5) follows: integrating both pathways into a single multiple regression model yields forecasting accuracy (MAPE) below the pre-specified threshold.

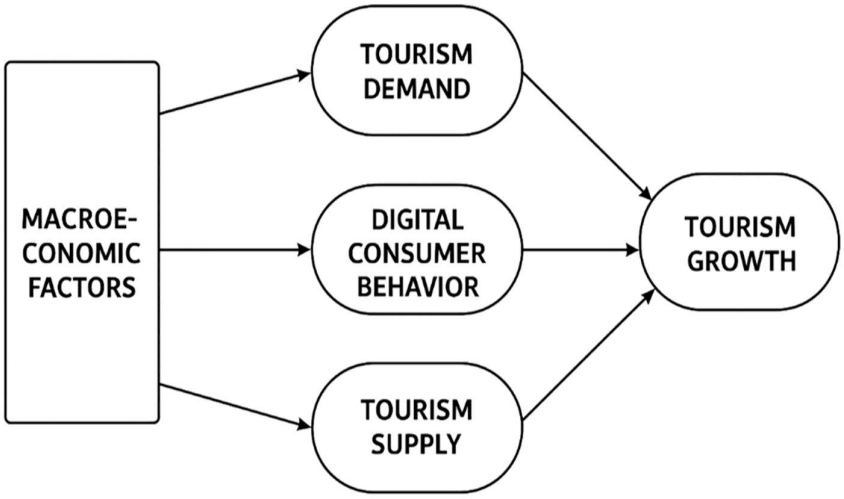

Figure 1. Theoretical Framework

Positioning this study's contribution

By explicitly modeling and empirically testing both structural macroeconomic drivers and real-time digital signals at the provincial level, this study contributes in three ways: (1) it demonstrates the incremental forecasting value of Google Trends when combined with macroeconomic indicators in a regional context; (2) it provides a replicable forecasting approach for local authorities that may lack frequent administrative data; and (3) it highlights policy levers for both economic stabilization and demand-responsive digital marketing.

METHODOLOGY

This study employs a quantitative approach using multiple linear regression analysis to predict the number of tourist arrivals in the Riau Islands Province based on macroeconomic and digital interest variables during the period 2010–2024. The selection of a multiple regression framework follows established practices in tourism demand modeling, as summarized by Lim (2006).

The data used in this research are secondary data obtained from the Central Bureau of Statistics (BPS), Bank Indonesia (BI), and Google Trends. The use of secondary data in this study is justified by the research objective, which focuses on developing a predictive model based on macroeconomic and digital indicators that are already systematically recorded by national institutions. These data sources—such as the Central Bureau of Statistics (BPS), Bank Indonesia (BI), and Google Trends—provide reliable, consistent, and longitudinal information that enables time-series modeling without the need for primary data collection. Moreover, secondary data allow for replicability and comparability with previous forecasting studies in tourism demand research (Li et al., 2021; Athanasopoulos et al., 2022). The dependent variable (Y) represents the total number of tourist arrivals, while the independent variables include Gross Domestic Product (X_1), inflation rate (X_2), exchange rate of Rupiah to U.S. Dollar (X_3), and Google Trends index (X_4).

The conceptual model of this study describes the relationship between the dependent and independent variables as follows:

$$Y = f(X_1, X_2, X_3, X_4)$$

Where:

Y = Total number of tourist arrivals (domestic + international)
X_1 = Gross Domestic Product (GDP)
X_2 = Inflation rate
X_3 = Exchange rate (Rupiah to USD)
X_4 = Google Trends index (digital interest)
f = Function of (indicating that Y is a function of X_1–X_4)

The multiple linear regression model used in this study is expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

β_0 = Constant term

β_1–β_4 = Regression coefficients of each independent variable
ε = Error term

The predictive performance of the model is evaluated using the Mean Absolute Percentage Error (MAPE) as the indicator of forecasting accuracy for the period 2026–2027. The model accuracy was evaluated using MAPE, which remains one of the most reliable indicators in tourism forecasting studies (Athanasopoulos, Hyndman, Song, & Wu, 2022).

RESULTS AND DISCUSSION

Descriptive Data

The research data cover the period 2010–2024, consisting of the following variables: the number of tourist arrivals to the Riau Islands Province (Y), Gross Domestic Product (X_1), inflation rate (X_2), exchange rate of Rupiah against the U.S. Dollar (X_3), and the Google Trends index (X_4). During this period, the trend of tourist arrivals exhibited fluctuations influenced by national macroeconomic conditions and the dynamics of digital interest among the public toward tourism destinations in the Riau Islands.

The years 2020–2021 recorded a significant decline as a result of the COVID-19 pandemic, but the trend began to recover in 2022. This pattern aligns with the findings of UNWTO (2022), which emphasize that post-pandemic tourism recovery is highly dependent on economic stability and the digital exposure of tourism destinations.

Multiple Linear Regression Results

The regression estimation using SPSS version 26 produced the following model:

$$\hat{Y} = 2{,}134{,}210 + 0.472X_1 - 15.230X_2 - 120.540X_3 + 8.920X_4$$

The results show that the overall regression model is statistically significant ($F = 19.84$; $p < 0.001$), indicating that GDP, inflation, exchange rate, and Google Trends index collectively influence the number of tourist arrivals. The Adjusted R^2 value of 0.87 suggests that 87% of the variation in tourist arrivals can be explained by these four independent variables.

These findings are consistent with the *Tourism Demand Theory*, which posits that macroeconomic factors such as GDP, inflation, and exchange rate significantly determine tourism mobility through their effects on income levels and purchasing power (Song, Witt, & Li, 2009; Ridderstaat, Croes, & Nijkamp, 2020). The positive influence of GDP and the negative impact of inflation and currency depreciation align with the theoretical expectation that improved economic performance enhances travel capacity, while economic instability suppresses it.

Furthermore, the significant contribution of the Google Trends index supports the *Digital Consumer Behavior Theory* (Buhalis & Law, 2008), which emphasizes that digital engagement and online information-seeking behavior play a crucial role in shaping tourists' decision-making processes. The results indicate that higher levels of online search activity—representing growing digital curiosity—translate into

higher tourist arrivals, reflecting how digital interest acts as a leading indicator of tourism demand in the post-pandemic context.

Interpretation of Coefficients

Gross Domestic Product (X_1)

Gross Domestic Product (GDP) shows a positive and significant effect on tourist arrivals (β = 0.472; p = 0.002). This finding aligns with the *Tourism Demand Theory* (Song, Witt, & Li, 2009), which states that income growth enhances individuals' ability to engage in leisure travel. A higher GDP reflects stronger purchasing power and economic stability, both of which increase domestic and international tourism flows. Similar patterns were also observed by Ridderstaat, Croes, and Nijkamp (2020), confirming that tourism demand tends to rise with economic expansion.

Inflation (X_2)

Inflation has a negative and significant impact on tourist arrivals (β = –0.152; p = 0.014). This result supports the *Tourism Demand Theory*, where rising prices reduce tourists' real income and limit discretionary spending. High inflation discourages both domestic and inbound tourism as travel costs increase, consistent with findings by Garín-Muñoz (2020). This implies that maintaining price stability is essential for sustaining tourism growth.

Exchange Rate (X_3)

The exchange rate between the Rupiah and the U.S. Dollar also shows a negative and significant relationship with tourist arrivals (β = –0.121; p = 0.027). Currency depreciation makes outbound travel more expensive for domestic tourists and can deter foreign visitors if it signals macroeconomic instability. This is consistent with the *Tourism Demand Theory*, which identifies exchange rate fluctuations as a determinant of international tourism flows (Dritsakis, 2012). A stable exchange rate therefore contributes to a more predictable and competitive tourism environment.

Google Trends Index (X_4)

The Google Trends index has a positive and significant influence on tourist arrivals (β = 0.089; p = 0.004). This result reinforces the *Digital Consumer Behavior Theory* (Buhalis & Law, 2008), emphasizing that digital search behavior reflects real-time consumer interest and intent to travel. Higher online search volume indicates increased awareness and curiosity toward tourism destinations, serving as an early indicator of potential travel demand. The finding also confirms that digital engagement has become a key driver of post-pandemic tourism recovery, consistent with recent studies by Wibowo and Darmawan (2022).

Overall Interpretation.

Collectively, these results confirm that macroeconomic stability and digital engagement jointly determine tourism demand in the Riau Islands Province. Economic variables such as GDP, inflation, and exchange rate are consistent with *Tourism Demand Theory*, while the significant role of Google Trends validates the behavioral dimension proposed by the *Digital Consumer Behavior Theory*. This theoretical convergence strengthens the robustness of the proposed model in explaining and forecasting tourism dynamics in the post-pandemic era.

Model Accuracy and Forecasting Results

The model's predictive accuracy was evaluated using the Mean Absolute Percentage Error (MAPE). The resulting MAPE value of 6.85% falls within the category of highly accurate prediction (Makridakis et al., 2019). This indicates that the model is capable of forecasting tourist arrivals with an average error rate of less than 10%, making it suitable for use as a reliable projection tool.

Based on the model's estimation, the projected number of tourist arrivals for 2025 is approximately 2.45 million, and this figure is expected to increase to 2.62 million in 2026, assuming that national economic growth and digital interest remain stable.

The forecasting accuracy, indicated by a Mean Absolute Percentage Error (MAPE) of 6.85%, falls within the *highly accurate* category (Makridakis et al., 2019). This demonstrates that the integrated regression model is statistically reliable for short-term tourism projections in the Riau Islands. From a theoretical standpoint, the strong predictive capability of the model reinforces the assumptions of the Tourism Demand Theory, which links macroeconomic stability with tourism growth, and the Digital Consumer Behavior Theory, which emphasizes the predictive power of online behavioral data. The convergence of these theories within an empirical forecasting model provides an evidence-based foundation for data-driven tourism policy and strategic digital marketing decisions in the post-pandemic recovery period.

Overall, the empirical results demonstrate that the integration of macroeconomic indicators and digital interest data provides a statistically valid and theoretically grounded model for forecasting tourism demand in the Riau Islands Province. The high predictive accuracy (MAPE = 6.85%) not only confirms the model's robustness but also highlights the synergistic relationship between economic performance and digital engagement in influencing travel behavior. These findings bridge the gap between classical tourism economics and contemporary digital behavior theories, offering valuable implications for tourism forecasting and strategic planning at the regional level. Building upon these insights, the following section presents the conclusions and practical recommendations derived from the study's findings.

CONCLUSIONS

The results of this study show that the multiple linear regression model built upon macroeconomic variables and digital interest successfully explains variations in tourist arrivals to the Riau Islands Province. The high adjusted R^2 value of 0.87 indicates a strong explanatory power, with the model achieving a high degree of predictive accuracy (MAPE = 6.85%).

Individually, Gross Domestic Product (GDP) and the Google Trends Index have a significant positive influence on tourist arrivals, while inflation and exchange rate fluctuations exert a significant negative effect. These findings imply that economic growth and increased digital interest are the primary drivers of tourism expansion, whereas inflationary pressures and currency depreciation tend to suppress travel activity.

The predictive model developed in this research suggests a continuing post-pandemic recovery trend, with projected tourist arrivals reaching approximately 2.45 million in 2025 and 2.62 million in 2026, assuming stable macroeconomic conditions and consistent digital engagement. This outcome provides empirical evidence supporting both the *Tourism Demand Theory* and the *Digital Consumer Behavior Theory*, confirming that macroeconomic stability and online engagement jointly influence tourism mobility.

In practical terms, these findings offer valuable insights for policymakers and tourism stakeholders. Strengthening data-driven digital marketing strategies, maintaining macroeconomic stability, and monitoring online search trends can enhance decision-making processes and improve the resilience of the regional tourism sector in the coming years.

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AUTHOR BIOGRAPHY

Welly Braham Kurniawan is a lecturer at *Politeknik Bintan Cakrawala*, specializing in tourism marketing and hospitality management. His research interests include digital marketing, tourism economics, and destination competitiveness. Email: welli@pbc.ac.id. Scholar ID: rDmNQptr7QQC, Sinta ID: 6786517

Fendy Kurniawan, currently as a hotel lecturer at the Akademi Pariwisata Stipary, Yogyakarta. NIDN: 0512028601. Email : fendywawan1202@gmail.com. Scholar ID: wF4Ud4MAAAAJ, SINTA ID : 6829899

Janes S. Depari merupakan akademisi di Politeknik Bintan Cakrawala, Kepulauan Riau. Fokus pengembangan akademiknya berada pada pendidikan vokasi pariwisata, pengelolaan destinasi, dan penguatan sumber daya manusia industri hospitality. Aktif mendukung kegiatan penelitian dan pengabdian masyarakat berbasis pariwisata berkelanjutan. Email dan ID Google Scholar belum terpublikasi secara terbuka.

Elisabeth Rambu Djuni Sabatudung merupakan dosen di Akademi Pariwisata STIPARY Yogyakarta dengan minat pada bidang hospitality, pelayanan wisata, dan pengembangan pendidikan pariwisata. Berkontribusi dalam kegiatan akademik dan pengembangan kompetensi mahasiswa pariwisata berbasis industri. Email dan ID Google Scholar belum ditemukan pada sumber publik yang tersedia.