

# Analyzing TripAdvisor reviews to improve service quality at Courtyard Marriott Bali Nusa Dua Resort

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## Abstract

**Purpose:** This study aims to explore trends in guest satisfaction at the Courtyard by Marriott Bali Nusa Dua Resort by analyzing online reviews from TripAdvisor, with the objective of enhancing service quality.

**Methods:** The research follows a systematic methodology that begins with scraping guest reviews from TripAdvisor, ensuring the collection of relevant data. Subsequently, a thorough data cleaning and preprocessing process is undertaken to guarantee high-quality data. The study then utilizes time series analysis, specifically the ARIMA model, to analyze the evolving patterns of guest satisfaction over time.

**Results/findings:** The findings show that the majority of guest feedback is positive, indicating general satisfaction with the hotel. The ARIMA model reveals that guest satisfaction is highly influenced by previous satisfaction levels, suggesting a trend where past experiences strongly impact future perceptions.

**Conclusions:** These results provide valuable insights into the key drivers of guest satisfaction, offering actionable recommendations for hotel management. By understanding the dynamic factors that influence guest experiences, management can improve service quality, respond more effectively to unexpected situations, and remain competitive in the market.

**Limitations:** The ARIMA model does not account for external factors, such as holiday seasons or marketing changes, nor does it analyze the specific content of reviews or differentiate between guest segments. Additionally, comparisons with competitors can provide a broader strategic context for a more comprehensive understanding.

**Contribution:** The combination of sentiment analysis and time series forecasting in this study offers a unique contribution, enabling data-driven decisions that support continuous service improvement and customer satisfaction.

**Keywords:** *Arima Model, Guest Satisfaction, Hospitality Management, Hotel Service Quality, Sentiment Analysis, Time Series Analysis, Tripadvisor Reviews*

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## 1. Introduction

TripAdvisor is one of the world's largest travel platforms, offering travelers a space to read and write reviews, compare prices, and book accommodations, restaurants, and attractions (Özen, 2021). The increasing number of hotel accommodations in Bali has intensified competition within the hospitality industry. Hotel operators must offer high-quality services to attract and retain guests. By analyzing reviews on TripAdvisor, hospitality businesses like Courtyard Marriott Bali Nusa Dua Resort can gain

deep insights into service quality, customer expectations, and potential areas for improvement (Amarawati, Pitanatri, & Pratiwi, 2025; Candra, Pitanatri, & Pinaria, 2025; Fachrudin, Tarigan, & Iman, 2022). This makes TripAdvisor not only a review platform but also a strategic asset for enhancing service excellence in the competitive tourism industry (Mihălcescu, Sion, Vlăgioiu, & Neagu, 2024; Xiang, Du, Ma, & Fan, 2017).

Badung Regency is one of the primary tourist destinations in Bali Province. It is home to many attractions favored by travelers, such as Kuta, Pandawa, and Jimbaran beaches, Uluwatu, and Nusa Dua. Given its popularity and accessibility, Badung has become a strategic area in the hospitality industry, particularly for hotel development. According to data from the Central Statistics Agency BPS (2025), the number of star-rated hotels in Badung increased significantly from 289 in 2020 to 417 in 2024. This growth occurred across all classes, from 1-star to 5-star hotels. Detailed data for the 2020–2024 period show fluctuations and upward trends in several classes. For example, the number of 1-star hotels grew from five units in 2020 to a peak of 22 in 2023 before slightly declining to 17 in 2024. Meanwhile, the number of 2-star hotels more than doubled, from 35 in 2020 to 69 in 2024. 3-star hotels also experienced growth until 2023, but slightly declined in 2024. In contrast, 4-star hotels showed consistent growth until 2023 before stabilizing. Notably, the number of 5-star hotels increased steadily from 47 in 2020 to 85 in 2024, reflecting a rising demand for luxury accommodations.

Table 1. Number of Accommodation Units in Badung Regency (2020-2024)

Type of Hotel	2020	2021	2022	2023	2024
1-Star Hotel	5	1	15	22	17
2-Star Hotel	35	26	31	39	69
3-Star Hotel	114	119	144	153	121
4-Star Hotel	88	102	125	130	125
5-Star Hotel	47	60	65	69	85

Source: BPS (2025)

The competition among 5-star hotels in Badung Regency has become increasingly intense due to a surge in high-end hotel development (Ladhari, 2009). As more luxury hotels enter the market, each brand must work harder to differentiate itself through unique guest experiences, superior service quality, and world-class amenities (Law et al., 2009). This competition drives innovation in the hospitality sector, pushing hotels to invest in staff training, sustainability initiatives, and digital marketing strategies to attract affluent travelers to their hotels. Moreover, the close proximity of many 5-star hotels in areas such as Nusa Dua and Jimbaran intensifies the rivalry, as guests can easily compare offerings and prices. To remain competitive, 5-star hotels must continuously enhance their service excellence, maintain strong online reputations through platforms such as TripAdvisor, and adapt quickly to changing guest expectations and global travel trends.

Guest satisfaction plays a key role in maintaining customer loyalty and enhancing hotel reputation. One of the most crucial indicators of guest satisfaction is online reviews and ratings, particularly on platforms such as TripAdvisor (Gustiani, 2018). These platforms allow guests to share their experiences, which significantly influence prospective customers' accommodation decisions. Guest satisfaction is determined by several, interrelated factors. The Courtyard by Marriott Bali Nusa Dua Resort, a five-star hotel located in the premium area of Nusa Dua, has received numerous guest reviews that can be analyzed to identify which service aspects most influence customer satisfaction. By understanding satisfaction trends, the hotel can develop more effective strategies to enhance service quality and strengthen competitiveness (Sanjiwani, Pitanatri, & Loanata, 2025). This study aims to identify guest satisfaction trends at the Courtyard by Marriott Bali Nusa Dua Resort based on reviews on TripAdvisor, thereby providing strategic recommendations to improve service quality and retain guest loyalty.

The Courtyard by Marriott Bali Nusa Dua Resort is dominated by business travelers, both domestic and international. This indicates that hotels are the top choice for business-related trips. Its main appeal for

this market segment includes productivity-supporting facilities such as meeting rooms, high-speed Internet, and professional services. The hotel's strategic location in Nusa Dua, a hub for international conferences and business events, further boosts its attractiveness to professionals. Combining complete business amenities with a comfortable atmosphere for relaxation, Courtyard by Marriott effectively meets the needs of business travelers.

**Table 2. Occupancy Rate of Courtyard by Marriott Bali Nusa Dua Resort (2021–2024)**

Year	Target Occupancy (%)	Actual Occupancy (%)	Achievement Rate (%)
2021	85.0	60.0	70.6
2022	85.0	75.0	88.2
2023	85.0	80.0	94.1
2024	85.0	86.6	101.9

Source: Courtyard by Marriott Bali Nusa Dua Resort, 2025

The occupancy rate data for the Courtyard by Marriott Bali Nusa Dua Resort between 2021 and 2024 revealed a gradual recovery in guest volume following a significant drop in 2021. In that year, the hotel achieved only a 60.0% occupancy rate against a target of 85.0%, reaching only 70.6% of its goal. This shortfall may have been influenced by various factors, including limited travel due to the pandemic, changing guest expectations, and negative service-related experiences. In this context, platforms such as TripAdvisor play a critical role in shaping guest perceptions and influencing booking decisions. Guest reviews and ratings provide direct feedback on service quality elements, such as cleanliness, staff responsiveness, and amenities. Poor reviews or unresolved complaints on TripAdvisor can significantly deter potential guests, especially in a competitive market like Nusa Dua, where alternatives are readily available.

In the following years, the hotel's actual occupancy rate gradually improved to 75.0% in 2022, 80.0% in 2023, and eventually surpassing the target in 2024 with an 86.6% rate (101.9% achievement). This upward trend coincides with stronger guest satisfaction, as reflected in positive TripAdvisor reviews. The data suggest that improved service quality and hotel responsiveness to guest feedback contribute to higher occupancy rates. Therefore, monitoring and managing TripAdvisor reviews is vital for understanding guest satisfaction and directly impacts the hotel's ability to meet and exceed its occupancy targets (Mariani & Borghi, 2020). High-quality service, when consistently delivered and positively reviewed, enhances a hotel's online reputation and serves as a persuasive factor for future guests choosing their stay.

**Table 3. Comparison of Hotel Ratings near Courtyard by Marriott Bali Nusa Dua**

Hotel Name	Distance	TripAdvisor Rating
Marriott's Bali Nusa Dua Gardens	0.1 km	4.5 / 5
Awarta Nusa Dua Resort & Villas	1.6 km	5.0 / 5
The Laguna, a Luxury Collection Resort & Spa, Nusa Dua	1.2 km	4.5 / 5
Hotel Santika Siligita Nusa Dua Bali	0.5 km	4.0 / 5
Merusaka Nusa Dua	0.4 km	4.5 / 5
Club Med Bali	1.8 km	4.5 / 5

Source: TripAdvisor, 2025

The data comparing the TripAdvisor ratings of five-star hotels surrounding the Courtyard by Marriott Bali Nusa Dua Resort highlight the intense level of competition in the area. Several nearby hotels, such as Awarta Nusa Dua Resort & Villas with a perfect 5.0 rating, and others like The Laguna, Club Med Bali, and Merusaka Nusa Dua, all with high ratings of 4.5, demonstrate that many competitors offer equally exceptional service quality. Marriott itself holds a strong rating of 4.5, but this is not

significantly higher than others, meaning that even small declines in service quality could cause it to lose competitive ground. The similarity in ratings indicates that guests have multiple equally attractive options, and any differentiation depends heavily on consistently excellent service, personalized guest experiences, and strong reputation management. In such a saturated luxury market, maintaining or improving Marriott's position requires continuous innovation and responsiveness to customer feedback.

One key strategy for maintaining strong customer relationships is listening to customer feedback, both positive and negative, through online platforms. These reviews are not only verbal expressions but are also written and published on digital media (e.g., forums and travel-related websites). As noted by Dang, Moreno-García, and De la Prieta (2020), the process of extracting sentiment from reviews helps determine whether a comment is positive, negative, or neutral. In addition, Fitchett, Dillard, McCarthy, Lambert, and Mosley (2020) emphasized that TripAdvisor reviews offer more objective insights because users can identifying satisfaction trends through TripAdvisor reviews is crucial in enhancing service quality at Courtyard by Marriott Bali Nusa Dua Resort. By analyzing year-on-year sentiment changes, management can better understand the key drivers of guest satisfaction and dissatisfaction. For instance, an increase in negative reviews during a certain period could signal cleanliness issues, unresponsive staff, or poorly maintained facilities. Conversely, a rise in positive reviews can highlight successful service strategies that are worth maintaining. Additionally, monitoring reviews serve as a direct form of customer feedback that helps hotels tailor more targeted policies. Understanding guest preferences and expectations enables hotels to take strategic actions to improve guest experiences, address service shortcomings, and maintain a competitive edge in the hospitality sector (Wijaya, 2022).

This research focuses on guest sentiment at the Courtyard by Marriott Bali Nusa Dua Resort through a time series analysis of TripAdvisor reviews, aiming to optimize guest satisfaction. The contribution of this study is to provide deeper insights into satisfaction trends reflected in guest ratings on TripAdvisor using a time-series approach. It aims to identify patterns and fluctuations in hotel reviews. Through time-series analysis, this study offers an evidence-based framework for evaluating service quality and developing strategies for continuous improvement. The results may provide valuable insights for hotel management to enhance guest experiences and strengthen the hotel's online reputation.

## **2. Literature review**

### **2.1 Customer Satisfaction**

Customer satisfaction refers to the feelings of pleasure or disappointment experienced by a customer after comparing the actual performance of a product or service with their expectations. It is an important measure of how well a company meets customer expectations. Several factors contribute to customer satisfaction, including product quality, service quality, emotional factors, price, and cost. Each factor plays a role in shaping the overall satisfaction a customer feels with a service or product. To measure customer satisfaction, indicators such as alignment with expectations, willingness to revisit, and willingness to recommend products to others are commonly used. These indicators reflect a customer's overall satisfaction and future behavior regarding a product or service (Pangesti, Resmi, & Utami, 2024).

### **2.2 Service Quality**

Service quality refers to how well a service meets or exceeds customer expectations. It is a critical factor in business strategies and customer satisfaction. TripAdvisor is a widely used online travel platform that allows users, primarily tourists and hotel guests, to share their experiences through written reviews, ratings, and photos. These reviews serve as critical feedback for hospitality providers and influence other travelers' decisions. In the context of this study, the independent variable (IV) is customer reviews on TripAdvisor, which include specific comments on various aspects of hotel services, such as cleanliness, staff friendliness, amenities, location, and value for money (Herlambang & Komara, 2021). The dependent variable (DV) is the perceived service quality at the Courtyard Marriott Bali Nusa Dua Resort. TripAdvisor reviews serve not only as a mirror of guest perceptions but also as a strategic input for service improvement efforts (Utami, Cahyadi, & Ernawati, 2023).

### 2.3 Time Series Analysis

Time-series analysis refers to the study of data points collected at regular intervals over time. It aims to understand data patterns and forecast future values of the data. Various patterns in time series data include horizontal, trend, seasonal, and cyclical, which help in understanding fluctuations and trends in the data over time (Permatasari, Linawati, & Jasa, 2021).

### 2.4 Evaluation on TripAdvisor Platform

TripAdvisor is a popular platform where guests can provide reviews and ratings based on their hotel experiences. These reviews cover aspects such as service quality, comfort, and overall value. TripAdvisor evaluations are considered crucial indicators of service quality and customer perceptions.

### 2.5 Hypothesis

A hypothesis is a predictive statement that establishes a possible relationship between two or more variables in a study. It provides a focused direction for the investigation by setting expectations that can be tested through data analyses. The purpose of this study is to examine whether sentiment analysis and ARIMA time series modeling can accurately capture and predict guest satisfaction trends based on TripAdvisor reviews. This allows researchers to explore the effectiveness of review-based data in assessing service quality over time. The hypothesis of this study is as follows:

H<sub>0</sub>: Sentiment analysis and ARIMA-based time-series forecasting do not significantly enhance the evaluation and prediction of guest satisfaction trends at the Courtyard by Marriott Bali Nusa Dua Resort.

H<sub>1</sub>: Sentiment analysis and ARIMA-based time-series forecasting significantly enhance the evaluation and prediction of guest satisfaction trends at the Courtyard by Marriott Bali Nusa Dua Resort.

## 3. Research methodology

This study focuses on analyzing guest satisfaction at the Courtyard by Marriott Bali Nusa Dua Resort by examining reviews and ratings on TripAdvisor. The objective was to identify satisfaction trends, shifts, and key influencing factors to improve service quality. The research was conducted at the resort located in Nusa Dua, Bali, which spans 5 hectares and offers 242 rooms and various premium facilities. The study will cover a two-month period, from December 2024 to January 2025, to allow for thorough data collection and analysis. The absolute population includes all TripAdvisor reviews of the hotel, which were cleaned to remove errors and duplicates. The variables analyzed included customer reviews, satisfaction, service quality (based on SERVQUAL), and review trends using time series analysis (Khotimah, 2024). Data collection uses Python and Google Collabs to scrape reviews over the past five years, followed by a cleaning process involving the handling of duplicates, missing values, and outliers. ARIMA modeling was employed to analyze and forecast guest satisfaction trends, guiding the hotel's strategic decisions. The analysis results were visualized using pie, bar, and line charts to support interpretation and decision-making.

Through the application of ARIMA, hotel management at Courtyard Marriott Bali Nusa Dua Resort can detect both short- and long-term shifts in customer sentiment. This predictive capability supports more strategic planning, allowing hotels to anticipate potential declines in service quality or identify successful service initiatives that should be maintained or expanded (Alwi & Budiman, 2024). Unlike traditional descriptive analyses, which only reflect past and present performance, ARIMA enables a forward-looking perspective, facilitating proactive decision-making. The results generated from ARIMA modeling are visualized through charts, such as pie charts, bar charts, and line graphs, to enhance interpretability and support managerial decision-making (Akmal, Ayyubi, & Hidayansyah, 2024). These visual tools make complex forecasting results more accessible and actionable for non-technical users. The general formula for the ARIMA(p,d,q) model is as follows:

$$Y_t = c + \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \dots + \phi_p Y_{t-p} + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \dots + \theta_q \epsilon_{t-q} + \epsilon_t \dots \dots \dots (1)$$

#### 4. Results and discussion

Based on the data analysis, the reviews were categorized into two sentiment groups: Positive and Negative. Reviews with ratings of 4 and 5 were classified as positive, while those with a maximum rating of 3 were classified as negative. The categorization results show that the majority of reviews were positive, totaling 1,861, whereas negative reviews amounted to 273. The bar chart visually compares the number of reviews in each category, clearly illustrating the dominance of positive reviews over negative ones.

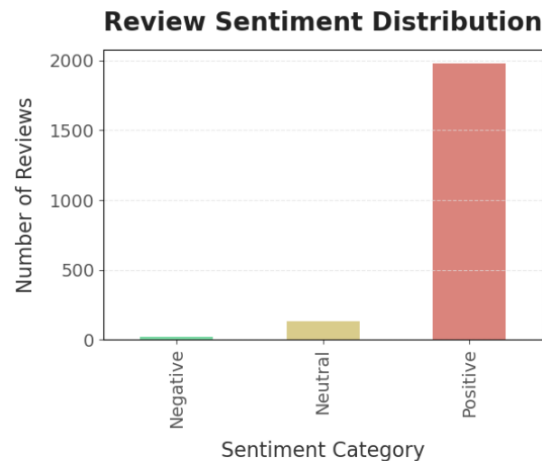


Figure 1. Sentiment Categories of Guest Reviews on TripAdvisor  
Source: Processed Data, 2025

The sentiment distribution of guest reviews for the Courtyard by Marriott Bali Nusa Dua Resort on the TripAdvisor platform clearly shows that the majority of reviews fall into the positive category, with nearly 2,000 reviews. This reflects a very high level of guest satisfaction and indicates that staying at this hotel generally leaves a favorable impression on guests. Meanwhile, neutral reviews are significantly fewer, only around 100 to 200, suggesting that a small portion of guests found their experience to be average or unremarkable. Negative reviews are recorded at a very low number, almost approaching zero, indicating that only a very small fraction of guests felt disappointed or dissatisfied with the services or facilities provided by the hotel. Overall, this sentiment distribution provides strong evidence that the hotel has an excellent service reputation in the eyes of its customers. These findings are also supported by the earlier keyword visualization, in which positive words dominated the reviews. Although the number of negative reviews is minimal, it remains important for the hotel to examine them carefully in order to identify and address potential issues that could impact guest satisfaction in the future.

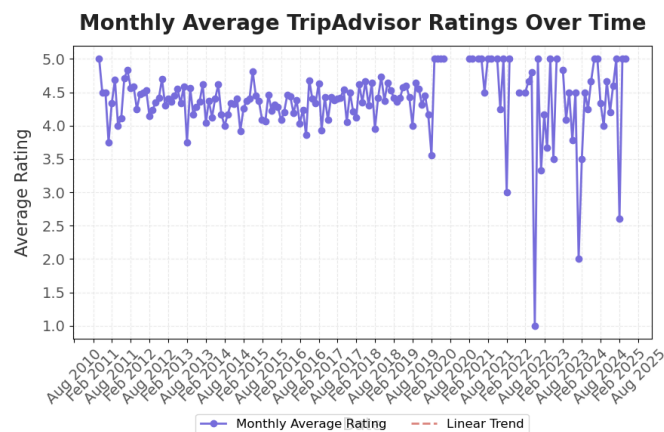


Figure 2. Average Monthly Review Ratings on the TripAdvisor Page  
Source: Processed Data, 2025

Based on the graph of average monthly review ratings on TripAdvisor for the Courtyard by Marriott Bali Nusa Dua Resort, there are notable fluctuations in guest satisfaction trends from 2010 to 2025. Initially, from 2010 to 2019, the hotel demonstrated strong performance, with average ratings consistently ranging between 4.2–4.7. This reflects a high level of guest satisfaction and indicates consistent service quality in delivering a satisfying experience. This period can be regarded as a "golden era," during which the hotel's service standards and facilities successfully met guest expectations. During the 2020–2021 period, a spike in ratings was observed, with some months reaching a perfect score of 5.0. This may have been due to a decrease in guest volume as a result of the COVID-19 pandemic, which allowed for more personalized and attentive service, or heightened hygiene protocols that were particularly appreciated by guests. Unfortunately, from 2022 to 2024, the graph reveals a drastic decline, with several months recording extremely low ratings, some falling below 2.0 and even nearing 1.0. This period signals serious issues in service quality, possibly linked to unresolved complaints, deteriorating facilities, or a growing gap between guest expectations and actual experience. However, signs of recovery began to emerge in 2025, as ratings began to climb back toward the 4.0 mark.

This indicates that improvement efforts have begun to show positive results and present an opportunity to rebuild the hotel's reputation. Moving forward, the hotel should conduct an in-depth audit of negative reviews from the critical 2022–2024 period, strengthen staff training and improve responsiveness to guest complaints. Reapplying the best practices from the pre-pandemic era and aligning them with current guest expectations could be an effective strategy for restoring customer trust and satisfaction.

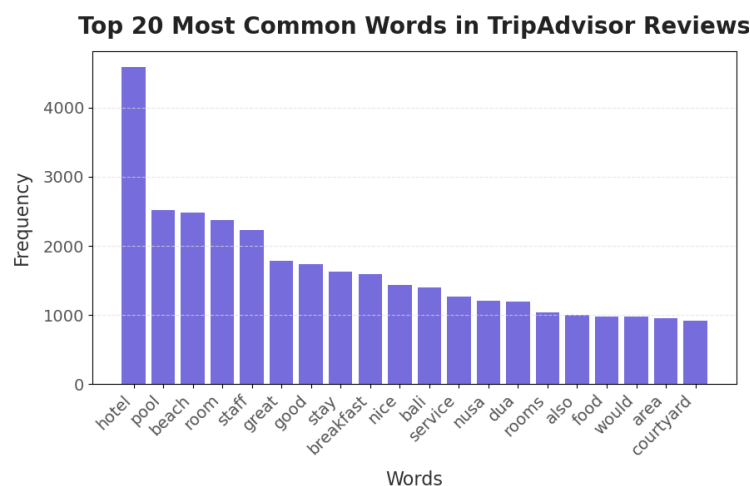


Figure 3. Word Count  
Source: Processed Data, 2025

The chart displays the 20 most frequently mentioned words in TripAdvisor reviews for the Courtyard by Marriott Bali Nusa Dua Resort. From the graph, it is evident that the word *"hotel"* appears most often, with a frequency of over 4,500 times, indicating that guests often discuss their overall stay experience in detail. This is followed by words such as *"pool," "beach," "room,"* and *"staff,"* suggesting that main facilities such as the swimming pool, beach access, room comfort, and interactions with staff are the aspects most commonly discussed by guests. Moreover, words such as *"great," "good,"* and *"nice"* reflect a predominance of positive sentiment, indicating that many guests were satisfied with the service and their experience. The frequent appearance of words such as *"breakfast," "service,"* and *"food"* also implies that culinary aspects and service quality are key areas of focus in the reviews. Interestingly, terms such as *"bali," "nusa," "dua,"* and *"courtyard"* also appear in the top 20, indicating that the hotel's location and brand identity made a strong impression on guests.

The chart highlights that the most influential aspects of the guest experience include room quality, key facilities such as the pool and beach, staff hospitality, and food and breakfast service. This offers a clear

picture of what guests pay attention to most, which hotels can use to prioritize areas for service improvement and promotional strategies. For a deeper insight, it would be beneficial to group words based on sentiment (positive/negative) to more specifically identify strengths and weaknesses.

ARIMA Analysis of TripAdvisor Review Data of Courtyard by Marriott Bali Nusa Dua Resort. Before building an ARIMA model, the first crucial step is to determine whether the time-series data are stationary. Stationarity means that the basic statistics of the data (mean and variance) do not change over time. ARIMA models assume that the data are stationary; therefore, if they are not, differencing must be applied.

To assess stationarity, the Augmented Dickey-Fuller (ADF) test was used:

Augmented Dickey-Fuller Test

ADF Statistic : -4.842812143387011

p-value : 4.500681445394884e-05

Critical Values :

1% : -3.4316356359901925

5% : -2.862108114273264

10% : -2.5670724075407443

The ADF test result shows a test statistic of -4.84 with a very small p-value (0.000045), which is lower than the critical values at all significance levels. This indicates that the data were already stationary. However, a visual inspection of the data revealed noticeable fluctuations, suggesting that differencing might still be necessary.

Model Identification Using ACF and PACF Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) plots are used to identify the order of the ARIMA model:

From the ACF plot, a slow decay pattern was observed, indicating that differencing may be required. After applying first-order differencing, the ADF test was performed again:

ADF Test on Differenced Series

ADF Statistic : -21.00474369587079

p-value : 0.0

The highly negative ADF statistic (-21.00) and p-value of 0.0 confirm that the differenced data are strongly stationary.

Estimation is the process of determining the best parameters for the ARIMA model, namely, the values of  $p$  (autoregressive),  $d$  (differencing), and  $q$  (moving average) that best capture the patterns in the data. Estimation is carried out using statistical techniques such as Maximum Likelihood Estimation (MLE) or Least Squares to find parameter combinations that minimize the prediction error. Once the data are made stationary (via differencing), the ARIMA model is estimated by testing various combinations of  $p$ ,  $d$ , and  $q$ , and then evaluated using metrics such as the Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC). Lower AIC/BIC values indicate a better model with optimal complexity than higher values.

Table 4. Stationarity Result

	Order	AIC	BIC
4	[0,1,1]	9455.9570457483	9469.0392557712
10	[1,1,1]	9456.6435056808	9476.2668207151
5	[0,1,2]	9456.6730631229	9476.2963781573
17	[2,1,2]	9457.9188149452	9490.6243400025
16	[2,1,1]	9457.9773857461	9484.141805792

Based on the lowest AIC value, the best-fitting model was:

Best Model : ARIMA(0, 1, 1)

AIC : 9455.96



BIC : 9469.04

Summary of the ARIMA(0,1,1) Model:

MA(1) Coefficient : -0.9865

Sigma<sup>2</sup> : 0.3705

The Ljung-Box test indicates that there is no significant autocorrelation in the residuals

Table 5. Ljung-Box Test

	lb_stat	lb_pvalue
10	11.1474633182	0.3461453117
20	16.7003156431	0.6723388559
30	33.1977839607	0.3140232024

A p-value greater than 0.05 at all lags indicates that the residuals are white noise, confirming the model's adequacy.

ARIMA Equation:

ARIMA(0,1,1) Model:  $(1-B) Y_t = (1 + -0.9864568134302131B)\epsilon_t$

Where B is the backshift operator,  $Y_t$  is the time series value at time t, and  $\epsilon_t$  is the error term.

$Y_t - Y_{t-1} = \epsilon_t + -0.9864568134302131\epsilon_{t-1}$ .....(2)

$Y_t = Y_{t-1} + \epsilon_t + -0.9864568134302131\epsilon_{t-1}$ .....(3)

Forecast Accuracy Metrics

Mean Squared Error (MSE) : 0.1149

Root Mean Squared Error (RMSE) : 0.3390

Mean Absolute Error (MAE) : 0.1323

The ARIMA(0,1,1) model was selected as the best-fitting model based on the lowest Akaike Information Criterion (AIC). This model specification suggests the need for first-order differencing (d=1) to achieve stationarity, with no autoregressive component (p=0) and a first-order moving average component (q=1). The model equation can be expressed as:  $Y_t = Y_{t-1} + \epsilon_t - 0.9865\epsilon_{t-1}$ , indicating that the current value of positive reviews is influenced by the previous value ( $Y_{t-1}$ ), the current error term ( $\epsilon_t$ ), and the previous error term ( $\epsilon_{t-1}$ ), with a strong negative coefficient of -0.9865.

The high magnitude of the moving average coefficient implies that the model is highly sensitive to shocks or unexpected events in previous periods. Such events may significantly impact the current volume of positive reviews, suggesting a strong corrective mechanism in the series. A large negative MA coefficient also indicates that positive deviations tend to be followed by negative ones, and vice versa, reinforcing the model's responsiveness to short-term anomalies. From a managerial perspective, this highlights the importance of responding swiftly to service issues or unexpected incidents. Sudden changes in service quality or guest experience can substantially influence the number of positive review comments. Therefore, hotel management should monitor guest feedback closely and act quickly to resolve issues to avoid lingering effects on future guest satisfaction. Moreover, the ARIMA (0,1,1) model serves as a valuable forecasting tool that enables the anticipation of review trends and proactive service planning. In terms of model performance, ARIMA(0,1,1) demonstrated good predictive accuracy, with a Root Mean Square Error (RMSE) of 0.339 and a Mean Absolute Error (MAE) of 0.132. These values indicate a relatively low forecasting error of approximately 0.13 positive reviews per day on average.

The time series pattern of positive reviews reveals noticeable fluctuations, with certain peaks and drops, indicating that guest satisfaction is not constant and may vary because of temporal factors. Although the Augmented Dickey-Fuller (ADF) test confirms stationarity after differencing (p-value = 0.000045), visual analysis supports the necessity of applying first-order differencing for better modeling. Upon comparing various ARIMA configurations, the (0,1,1) model emerged as the optimal model, with the lowest AIC (9455.96) and BIC (9469.04).

The implications of the model are critical for understanding the review dynamics. The need for differencing reflects gradual changes in guest satisfaction over time. The absence of an autoregressive component suggests that current review levels do not directly depend on longer-term historical patterns, indicating weak long-term memory in satisfaction dynamics. Meanwhile, the strong moving average term emphasizes the impact of recent, possibly isolated, experiences. The model equation, restated as  $(1 - B)Y_t = (1 - 0.9865B)\epsilon_t$ , demonstrates the influence of both the previous review value and error terms on current satisfaction levels. This reinforces the notion that sudden changes, whether positive or negative, can heavily influence guest sentiment and should be carefully managed. Model diagnostics further validate the adequacy of the ARIMA (0, 1, 1) model. The Ljung-Box test shows no significant autocorrelation in the residuals at lags 10, 20, and 30 (p-values > 0.05), indicating that the model has captured most of the data's underlying structure. Although the residuals exhibit slight positive skewness (1.63) and heavier tails (kurtosis = 6.88), the distribution is still within acceptable bounds for forecasting. Together with its low RMSE and MAE, the model proved to be a reliable and insightful tool for analyzing and predicting trends in guest satisfaction.

#### 4.1 Discussion

The ARIMA analysis of TripAdvisor review data for the Courtyard by Marriott Bali Nusa Dua Resort provides deep insights into the dynamics of guest satisfaction over time. Based on time-series visualization, the pattern of positive reviews fluctuates with occasional spikes and drops, reflecting variability in guest experiences. Although the Augmented Dickey-Fuller (ADF) test indicates stationarity (p-value = 0.000045), the ARIMA(0,1,1) model was selected for its ability to capture subtle trend variations through first-order differencing. This ARIMA(0,1,1) model was chosen because of its lowest AIC and BIC values, indicating that it was the most optimal without overfitting. The differencing component (d=1) suggests a gradual shift in guest satisfaction that must be incorporated into the analysis. The absence of an autoregressive component (p=0) implies that the number of positive reviews at any given time is not directly influenced by the reviews from previous periods.

The high moving average coefficient (q=1, with a value of -0.9865) indicates that unexpected events in the previous period have a significant short-term effect on current reviews, highlighting the hotel's need for immediate responsiveness to guest experiences. The model equation,  $Y_t = Y_{t-1} + \epsilon_t - 0.9865\epsilon_{t-1}$ , shows that positive reviews at a given time are highly dependent on the previous value and the error (shock) from the prior period. In other words, when a notable event occurs, whether positive or negative, its impact is quickly reflected in the reviews, followed by a strong corrective mechanism. This highlights the critical role of responsiveness, where a rapid reaction to guest concerns can significantly influence public perception. Model validation using the Ljung-Box test confirmed no significant autocorrelation in the residuals, indicating a good model fit. Additionally, low RMSE and MAE values reflect a strong predictive accuracy. However, the residuals showed slight skewness and leptokurtosis, suggesting that while the model is adequate, there is room for refinement.

The implications of this model are highly relevant to service quality improvement, aligning with the SERVQUAL framework.

1. **Reliability:** The consistency of positive trends indicates that guests generally perceive the hotel's service as dependable. Maintaining service reliability over time is essential for sustaining high satisfaction levels.
2. **Responsiveness:** The strong influence of recent shocks in the model shows that immediate responses to incidents significantly affect guest perception. A delay in addressing guest issues can lead to negative short-term impacts on review sentiments.
3. **Assurance:** Sustaining high levels of positive reviews demonstrates that guests feel confident and secure regarding the hotel's services. To preserve this, hotels must continue delivering knowledgeable and courteous services that build trust.
4. **Empathy:** While overall reviews are highly positive, the few negative reviews should be analyzed with a high degree of sensitivity. Personalized responses to complaints reflect hotels' genuine concern for guest well-being and can help mitigate dissatisfaction.

5. **Tangibles:** Although not directly modeled, fluctuations in satisfaction may also reflect the physical aspects of the property, such as room cleanliness, facilities, or aesthetics. Ongoing investment in physical improvements can further strengthen the impressions of guests.

Moreover, the model can help anticipate satisfaction drops during certain periods (e.g., peak seasons), allowing for better resource planning. Deviations between actual outcomes and model predictions can serve as evaluation tools for recently implemented service initiatives. However, the model has some limitations. It does not account for external factors such as holiday seasons or marketing changes, nor does it analyze the specific content of reviews or differentiate between guest segments. Future studies should integrate ARIMA with sentiment and topic modeling, include exogenous variables, and segment guests by demographics or visit purpose. Comparisons with competitors can also provide a broader strategic context. In conclusion, the ARIMA(0,1,1) model serves as an effective tool for the Courtyard by Marriott Bali Nusa Dua Resort's management to understand and respond to shifts in guest satisfaction. By leveraging insights from this model, hotels are better positioned to implement proactive measures aimed at improving service quality, strengthening brand reputation, and sustaining a competitive advantage within the dynamic landscape of the hospitality industry (Kuo, Fang, & LePage, 2022).

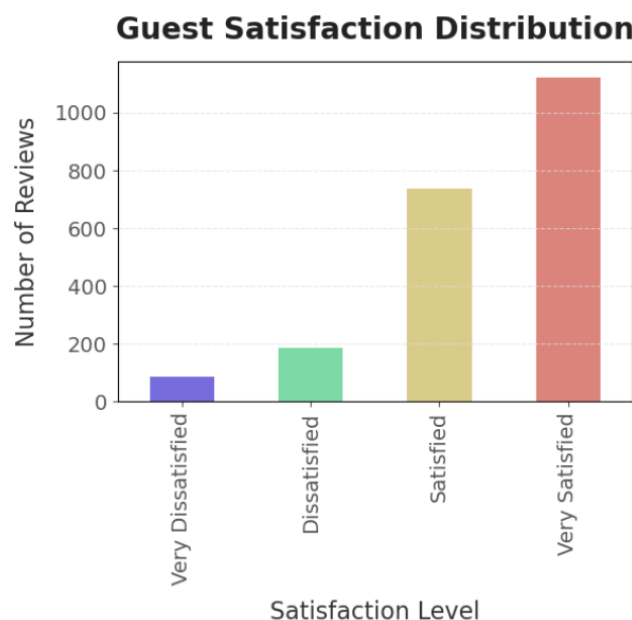


Figure 4. Satisfaction Level  
Source: Processed Data, 2025

Based on the distribution graph of guest satisfaction levels at the Courtyard by Marriott Bali Nusa Dua Resort, derived from TripAdvisor reviews, it is evident that the majority of guests gave highly positive ratings. The "Very Satisfied" category dominates with over 1,000 reviews, followed by the "Satisfied" category with approximately 700 reviews. This indicates that most guests felt satisfied or very satisfied with their stay at the hotel, reflecting high service quality. In contrast, negative reviews are relatively low, with the "Dissatisfied" category accounting for around 180 reviews and "Very Dissatisfied" falling below 100. Although the number is small, the presence of negative reviews warrants attention, as they may highlight critical service issues that could potentially lower guest satisfaction in the future (Kirilenko, Stepchenkova, & Dai, 2021).

Therefore, hotels must maintain their commitment to service excellence, which has consistently contributed to positive guest experiences and satisfaction (Ing & Dahlan, 2023). Simultaneously, attention must be given to the constructive criticisms highlighted in negative reviews, as they offer valuable insights for improvement. By systematically evaluating both positive and negative feedback, hotels can foster a culture of continuous enhancement. These findings serve as a vital basis for the

development of proactive service quality strategies that not only strengthen existing advantages but also swiftly and effectively address areas of concern identified through guest evaluations (Kuo et al., 2022).

## 5. Conclusion

### 5.1 Conclusion

This study provides a comprehensive analysis of guest satisfaction trends at the Courtyard by Marriott Bali Nusa Dua Resort through sentiment analysis and ARIMA-based time series forecasting using TripAdvisor review data. The results show a strong dominance of positive reviews, suggesting consistently high service quality and guest satisfaction, with temporary declines from 2022 to 2024. The ARIMA(0,1,1) model, selected for its optimal AIC and BIC values, demonstrates high predictive accuracy and reveals that recent guest experiences strongly influence satisfaction. The key findings highlight the importance of timely responsiveness, reliability, and consistency in service delivery. By applying time-series forecasting to online reviews, hotels can strategically anticipate fluctuations in satisfaction and proactively enhance service quality, reinforcing their competitive edge in the hospitality market.

### 5.2 Limitation

The limitation of the study, as mentioned in the document, is that the ARIMA model does not account for external factors, such as holiday seasons or marketing changes, nor does it analyze the specific content of reviews or differentiate between guest segments. The study also suggests that future research should integrate ARIMA with sentiment and topic modeling, incorporate exogenous variables, and segment guests based on demographics or purpose of visit. Additionally, comparisons with competitors can provide a broader strategic context for a more comprehensive understanding.

### 5.3 Suggestion

Based on these findings, the Courtyard by Marriott Bali Nusa Dua Resort should strengthen real-time monitoring of online reviews and implement immediate responses to guest concerns, especially during peak seasons or after service disruptions. Reinstating best practices from the hotel's "golden era" (2010–2019) while aligning them with post-pandemic guest expectations can help restore and sustain customer satisfaction in the long run. Furthermore, investments should be directed toward staff training, facility maintenance, and digital reputation management to uphold high service standards. Hotels should also leverage keyword trends and sentiment shifts to tailor marketing efforts and service innovations that resonate with guest preferences, ensuring long-term loyalty and occupancy growth.

## Acknowledgment

Although the ARIMA model provides valuable insights into guest satisfaction trends, this study has some limitations. It does not incorporate external variables, such as holidays, marketing campaigns, or macroeconomic factors, that may influence review patterns. Moreover, the analysis is limited to overall sentiment polarity and does not account for specific content, emotional intensity, or guest segmentation by demographics or purpose of visit. Future research should integrate advanced sentiment and topic modeling, include exogenous variables, and conduct comparative analyses with competing hotels to develop a more holistic understanding of the factors affecting customer satisfaction and service performance.

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