Revenue recommendation for Global Hotel and Resorts

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Executive Summary

GHR's mission is to foster mutually beneficial relationships with customers, creating value and ensuring a successful future for all stakeholders. To achieve this goal, we have identified key strategies to optimize revenue generation while enhancing customer satisfaction.

Firstly, by implementing measures to reduce last-minute cancellations and offering free upgrades within room categories, GHR can increase occupancy rates and drive revenue growth. Additionally, leveraging insights from our classification algorithm, which accurately predicts booking outcomes, allows us to fine-tune inventory management and pricing strategies for maximum profitability.

Furthermore, our recommendation to focus on changes within the same room class, while limiting higher-tier upgrades, strikes a balance between customer satisfaction and cost-effectiveness. In our operational strategy, we prioritize the utilization of executive and suite rooms when available, as these room categories offer higher revenue potential compared to deluxe rooms. By strategically filling executive and suite rooms first, we capitalize on their premium offerings and maximize revenue generation.

By executing these recommendations, GHR can achieve its revenue objectives while upholding its commitment to delivering exceptional value and building strong customer relationships, ensuring a prosperous future for the business.

Data Preparation

After conducting a thorough analysis of our booking data, we have identified several key actions to optimize our data preprocessing and enhance the accuracy of our models:

1. **Handling Null Values in Assigned Rooms:**

We will address all null values in the "Assigned Room" column by substituting them with the corresponding reserved room value. This ensures that each booking has a designated room assignment for better tracking and management.

2. **Removal of Booking Company Information:**

Due to the high prevalence of missing data (>95% NaN values), we have decided to remove the "Booking Company" column from our dataset. This streamlines our data processing pipeline and eliminates unnecessary noise.

3. **Treatment of Booking Distribution Channels:**

For the "Booking Distribution Channel" feature, we will prioritize either "TATO" or "Direct" channels, as these represent the primary booking channels. Other values may indicate customers opting out of using specific services.

4. **Management of Null Values in Countries:**

Initially, we erroneously identified "NA" as NULL values in the country column. Upon closer examination, it was revealed that there were no actual null values in the country column, despite initially treating "NA" as such. To accurately reflect the data, instances of "NA" were replaced with "Namibia," aligning with the correct country code used in the dataset.

5. **Deposit Type and Reserved Room Values:**

To improve data quality, we've implemented measures that involve removing records with missing "Deposit Type" information. Additionally, we have eliminated reserved room values from the dataset, as they constituted a negligible portion.

6. **Handling Missing Travel Agent Information:**

If the "Travel Agent" column contains null values, we will assume that customers did not utilize the services of a travel agent during booking instead of considering them as NULL.

7. **Booking Parking Information:**

Although "Booking Parking" data will not be utilized for modeling purposes, we will retain it for generating insights. The decision to include parking as a standard feature in our analysis stems from the observation that the majority of guests, typically vacationers, do not rent or bring their cars. This information may provide valuable insights into customer behavior, particularly regarding transportation preferences.

8. **Standardization of Number of People and Children:**

For bookings with missing information on the number of people and children, we assigned default values of 2 and 0, respectively. We opted for the values 2 and 0 specifically as they represent the mode value for the number of people and number of children, respectively. This ensures consistency in our dataset and facilitates accurate analysis.

By implementing these data preprocessing steps, we aimed to enhance the quality and reliability of our dataset, ultimately improving the effectiveness of our analytical models and decision-making processes.

DATA ANALYSIS

TOP 10 COUNTRIES BY VISITORS

Most bookings are done by local customers (Portugal) and followed by European citizens. We suggest including cuisines & cultural amenities from the top ten countries to make it culture-inclusive and include packages for people interested in all-inclusive experiences. Design exclusive promotions for Full Board packages targeting visitors from the top countries, showcasing the benefits of these options. Additionally, integrate elements of Portuguese cuisine and culture within the hotels for a unique and authentic experience, appealing to a broader range of guests. These strategies aim to diversify offerings, attract a wider audience, and contribute to increased bookings and overall guest satisfaction.

1.	Portugal	65,922	6.	Italy	8,244
2.	France	20,072	7.	Belgium	4,756
3.	Germany	14,360	8.	USA	4,623
4.	UK	12,543	9.	Brazil	4,206
5.	Spain	10,185	10.	Netherlands	3,490

Fig.1 Top 10 countries by number of bookings

POTENTIAL REVENUE LOST THROUGH BOOKING CHANGES:
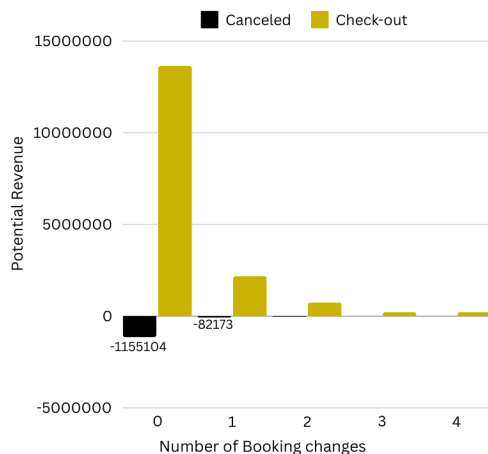

Fig. 2 Potential revenue by number of booking changes for canceled and check-outs

GHR is grappling with revenue losses due to last-minute cancellations after booking changes, with 18,000 booking changes observed out of 94,000 bookings, affecting approximately 12,000 reservations. It increases the uncertainty and difficult to make predictions. To address this issue, we propose implementing a nominal fee for each booking change, serving as a security

measure. This fee would be refunded upon the customer's checkout; otherwise, it could be retained as a penalty. This approach allows GHR to potentially charge 13% of the bookings, even in cases of cancellation, in addition to the existing fees applied for last-minute cancellations. Implementing this strategy aims to mitigate revenue loss and encourage more stable booking patterns.

BOOKING DISTRIBUTION CHANNEL VS NUMBER OF PEOPLE
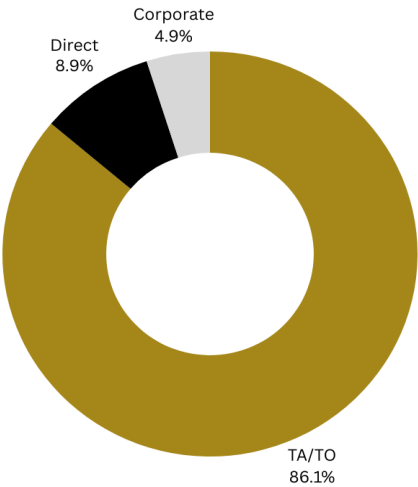

Fig. 3 Percentage of customers from different booking distribution channels

With tour operators and travel agents contributing 86% of our customer base, it is recommended to introduce incentives for these partners, fostering stronger collaborations and encouraging them to bring in more customers to our hotel. Additionally, we propose promoting direct bookings by offering customers memberships with exclusive perks such as royalty points and exclusive access. This dual strategy aims to cultivate fruitful relationships with travel partners while simultaneously enticing customers to choose direct booking channels, ultimately benefiting both GHR and its valued patrons.

REVENUE VS ARRIVAL TIME

Analyzing the two-year booking trend, it's evident that there is a notable surge in reservations during September and October, coinciding with two major festivals in Portugal. To capitalize on this peak demand, GHR should dynamically increase the Average Daily Rate during these months, considering them for
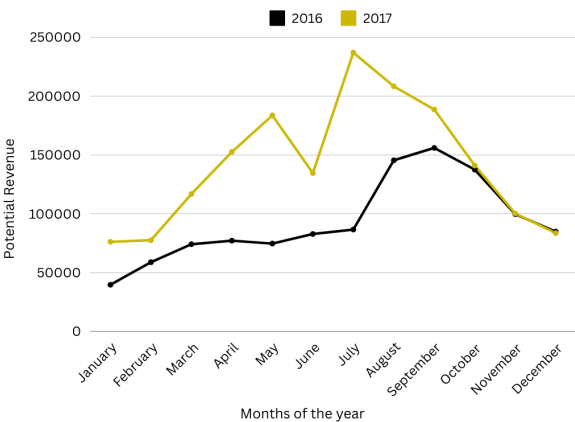

Fig. 4 Potential revenue made in each month of 2016 and 2017

festival-related rate hikes. Conversely, July, August, and December emerge as the weakest revenue months due to unfavorable weather conditions, marked by heavy rain. To counteract this, we recommend implementing price reductions or offering discounts on room rates during these rainy seasons to attract more bookings and optimize revenue. This dual strategy aims to align pricing strategies with demand patterns, maximizing profitability throughout the year.

REVENUE LOSS FROM FREE UPGRADES

In our comprehensive analysis, we introduced a novel metric, 'RC Free Upgrades,' aimed at evaluating the influence of room upgrades on revenue generation. By meticulously comparing assigned rooms with reserved ones, we identified instances of room assignment changes. Leveraging the average revenue associated with each room type, we quantified the financial impact of these upgrades. Notably, upgrades to higher room categories resulted in a loss of $185,373.64 for the hotel, while downgrades generated a profit of $28,485.626. This underscores the critical need for strategic room allocation management to optimize revenue and enhance overall guest satisfaction.

To address this, we recommend implementing the following strategies:

1. Adopt Tiered Pricing:

Offer guests standard and premium room upgrade options strategically priced to incentivize premium upgrades. This tiered approach, reminiscent of successful theater popcorn sales, aims to maximize revenue while providing guests with appealing value-based choices.

2. Offer Value-Added Packages:

Encourage guests to book premium rooms by bundling upgrades with value-added packages such as complimentary meals, spa treatments, or recreational activities. This not only enhances the guest experience but also contributes to increased revenue.

3. Limit Upgrade Availability:

Restrict the availability of free upgrades or set specific criteria (e.g., loyalty program membership, booking duration) for eligible guests. This approach minimizes the

potential revenue impact while ensuring strategic and intentional upgrade decisions.

Furthermore, considering historical cancellation data (e.g., a 20% cancellation rate for a specific room type in January), we recommend utilizing overbooking as a strategic tool. By incorporating conservative margins, such as overbooking by 15%, hotels can optimize occupancy rates while mitigating the risk of revenue losses from cancellations. Given the observed 40% average monthly room cancellations, a prudent strategy would be to overbook rooms by 25% to minimize revenue loss effectively. These proactive measures collectively aim to fine-tune revenue management strategies and promote financial stability for the hotel.

REVENUE LOSS DUE TO LAST-MINUTE CANCELATIONS

We determine the Revenue Loss due to Last-Minute Cancellations by analyzing the Reservation Status and cancellation date. If a booking is marked as "canceled" and the cancellation occurs within 3 days of the scheduled arrival, it is classified as a Last-Minute Cancellation. In such cases, the Revenue Loss is calculated as the Length of Stay minus 1 day, multiplied by the average daily rate, as the hotel retains one day's charge. Alternatively, if the cancellation falls outside this 3-day window, the Revenue Loss is deemed as 0, signifying sufficient time to secure new customers and mitigate financial impact.
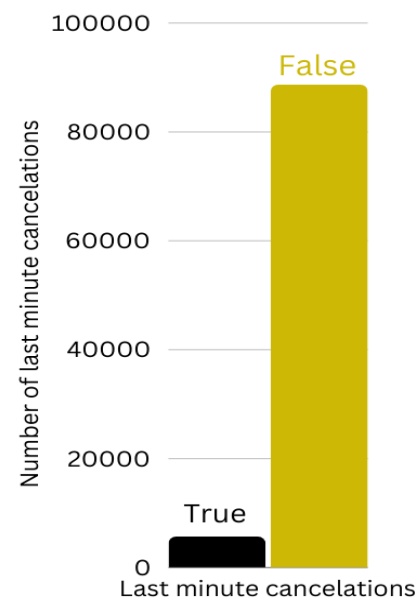

Fig. 5 Distribution of last minute cancellations

Implementing a dynamic inventory management system allows for proactive adjustment of room allocations, ensuring maximum revenue potential while maintaining guest satisfaction and operational efficiency.

1. Enhance Communication: Proactively communicate with guests before their arrival to confirm reservations and remind them of cancellation policies.

Providing personalized messages or incentives for early confirmations can encourage guests to commit to their bookings and reduce the risk of last-minute cancellations.

2. Optimizing Revenue Protection: Implement a dynamic cancellation fee structure that adjusts based on the timing of cancellations before the arrival date. For instance, charge a lower fee for cancellations made further in advance, such as 10 days before arrival, and incrementally increase the fee for cancellations made closer to the arrival date, such as 3 days prior. This approach incentivizes guests to cancel earlier, allowing the hotel more time to rebook rooms and minimize revenue losses from last-minute cancellations.

TOTAL REVENUE GAIN FROM HOTEL STAYS

In our revenue analysis methodology, the meticulous calculation of Total Revenue Gain involves a thorough examination of reservation statuses. When a reservation is designated as "canceled," the resulting revenue gain is diligently recorded as zero, accurately reflecting the absence of actual guest occupancy. Conversely, for reservations that proceed without cancellation, the Total Revenue Gain is determined by multiplying the Length of Stay by the Average Daily Rate, resulting in a revenue of €17,484,584.49 (€17.4 Million). This was for the approximate 2.5 years of data we had. This comprehensive approach ensures a nuanced understanding of revenue dynamics and contributes to a more accurate representation of the actual financial impact.

POTENTIAL REVENUE

In our revenue assessment, we calculate potential revenue, this involves aggregating the total gain from hotel stays, the revenue loss due to last-minute cancellations, and the revenue loss attributed to free upgrades. By summing up these crucial components, our total revenue generated reaches an impressive €15,923,608.77. This holistic analysis allows us to gain valuable insights into the overall financial performance, enabling strategic decision-making to optimize revenue streams and enhance the hotel's financial sustainability. Our projections indicate a substantial surge in forecasted revenue ranges, rising from approximately €2 million in 2015 (July - Dec) to €6 million in 2016. A further increase to €7.8 million by the end of 2017 was seen

RESULTS

CANCELLATIONS PREDICTION

We leverage a Random Forest Classifier algorithm to forecast hotel reservation cancellations by analyzing key features such as arrival week number, deposit type, and various booking-related parameters.

The combined classification report provides a comprehensive overview of the performance metrics for hotel reservation cancellations, encompassing both the 'Canceled' and 'Check-Out' categories. Our model can accurately predict 80% for 'Canceled' bookings and 76% for 'Check-Out' bookings. Additionally, our model has accurately identified 62% of 'Canceled' bookings while it accurately identified 89% for 'Check-Out' bookings, highlighting the model's effectiveness in capturing these reservation states within our dataset. Overall, with an accuracy rate of 77%, our model presents a reliable framework for predicting and managing hotel reservation statuses, enabling informed decision-making and operational optimization.

ROOM CHANGE PREDICTION

The accuracy of our classification model stands at 79.65%, indicating its overall effectiveness in predicting outcomes. The model achieves an overall weighted average F1 score of 81%, reflecting its robust performance across both classes.

POTENTIAL REVENUE FORECAST

Based on our analysis, we projected potential revenue growth by optimizing room occupancy and considering the average daily rate. Notably, forecasted revenue ranges surged from approximately 2 million euros in 2015 to 6 million euros in 2016. By the end of 2017, we anticipated a further increase to 7.8 million euros, with a slight dip to 7.6 million euros in 2018. Peaks observed in July and May 2017 indicate significant festive seasons, likely recurring in 2018. However, despite the upward trend from 2015 to 2017, our forecast suggests a potential decline in revenue trajectory, leading to an estimated fall in revenue of 0.2 million euros. However, the revenue can also increase depending on the festivals and the footfall in Portugal.
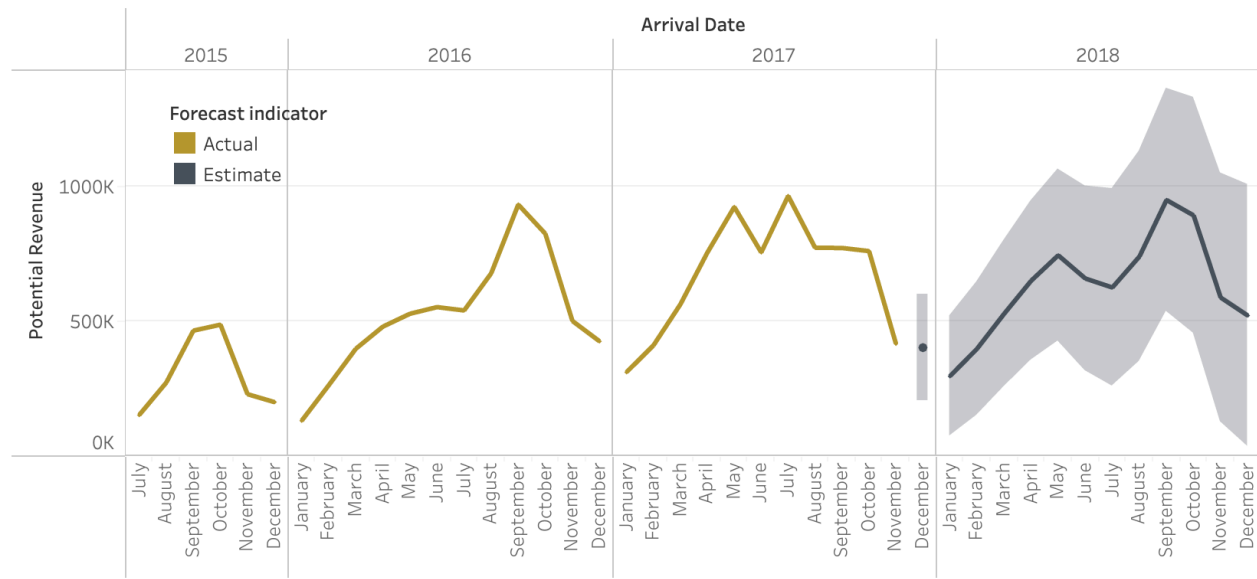
Fig. 5 Potential Revenue Forecast

Leveraging the information from the provided holiday calendar for Portugal in 2018 (sourced from timeanddate.com), the hotel can strategically capitalize on key dates to enhance total revenue. Here are recommendations for some of the main events:

New Year's Day (January 1, 2018):
Offer exclusive New Year's Eve packages with festive dinners and entertainment for guests staying over the holiday.
Impact on Revenue: Attracting guests seeking a memorable New Year's celebration can lead to increased bookings, higher room occupancy, and additional revenue from special event packages.

Easter Sunday (April 1, 2018):
Create Easter-themed packages with family-friendly activities and brunch specials to attract holidaymakers.
Impact on Revenue: Attracting families during the Easter weekend can boost bookings, enhance the guest experience, and generate additional revenue through special packages.

Labor Day / May Day (May 1, 2018):
Provide exclusive promotions or discounts, emphasizing relaxation and leisure for guests booking stays over the extended Labor Day weekend.

Impact on Revenue: Offering special incentives can attract more guests, contributing to increased room occupancy and revenue.

Portugal Day (June 10, 2018):

Organize cultural events, themed dinners, or live performances to celebrate Portugal Day, creating a unique guest experience.

Impact on Revenue: Attracting guests interested in cultural celebrations can lead to heightened demand, potentially resulting in increased bookings and additional revenue from special events.

Republic Day (October 5, 2018):

Design special promotions or packages for a patriotic experience, coinciding with Republic Day.

Impact on Revenue: Capitalizing on national celebrations can attract a diverse range of guests, potentially boosting bookings and generating revenue through exclusive Republic Day packages.

It's crucial to align these recommendations with the hotel's overall marketing strategy, considering the target audience, local preferences, and the competitive landscape. By tailoring offerings to coincide with significant holidays and observances, the hotel can enhance its appeal, encourage repeat visits, and ultimately contribute to the growth of total revenue.

CONCLUSION

Our analysis has unearthed key insights and strategic recommendations to optimize revenue, enhance guest satisfaction, and streamline operational processes for the hotel. Addressing the nuances of the data and understanding the business context, we propose a series of actionable steps:

Room Allocation and Booking Channels:

Implement tiered pricing for room upgrades, offering guests appealing choices. Encourage premium room bookings through value-added packages. Strategically limit the availability of free upgrades to minimize revenue impact. Leverage historical cancellation data for informed overbooking decisions.

Last-Minute Cancellations:

Introduce a nominal fee for booking changes to mitigate revenue loss. Implement proactive communication strategies and dynamic cancellation fees.

Booking Distribution and Partnerships:

Provide incentives to tour operators and travel agents for increased customer engagement. Promote direct bookings by offering memberships with exclusive perks.

Revenue Optimization Through Events:

Capitalize on major holidays with targeted packages to attract diverse guests. Dynamically adjust pricing during peak festival months for optimal revenue.

Room Upgrade Impact on Revenue:

Analyze and manage room upgrades strategically to optimize revenue. Adopt tiered pricing, offer value-added packages, and limit free upgrade availability.

Total Revenue Gain and Forecast:

Consider potential revenue loss due to last-minute cancellations and free upgrades. Forecast revenue growth by aligning room occupancy and average daily rate.

By implementing these recommendations, the hotel can aim to create a more efficient and customer-centric operation, attracting a diverse range of guests while safeguarding against revenue uncertainties. These strategic measures align with the hotel's overall business goals, contributing to sustained growth and improved financial stability in the dynamic hospitality industry.