Impact of Online Distribution Systems of Room Reservations on Hotel Revenue: A study of Selected Hotels of Delhi (NCR)

Ishan Bakshi¹, Assistant Professor
MMICT & BM (Hotel Management), Maharishi Markandeshwar (Deemed to be university),
Mullana-Ambala, Haryana, India 133207
ibakshi1988@gmail.com

Ankit² Gupta, Research Scholar
MMICT & BM (Hotel Management), Maharishi Markandeshwar (Deemed to be university),Mullana-Ambala, Haryana, India 133207
ankitgupta74@gmail.com

Abstract
This study explored the impact of online distribution systems (ODS) on the revenue of selected hotels in Delhi (NCR). Data were collected from 112 hotel managers representing 56 star-rated hotels in the region. A survey questionnaire assessed various attributes of ODS and their effect on hotel revenue. After conducting exploratory factor analysis (EFA), nine underlying factors were identified. A multiple regression analysis was then performed to determine the impact of these factors on hotel revenue. The results indicated that five out of the nine factors, namely user-friendliness, ease of access, time-saving efficiency, payment security, and discounts/offers, were found to significantly impact hotel revenue. These findings provide valuable insights for hotel management and the ODS industry, emphasizing the importance of specific attributes in driving revenue growth. Hotel managers can use this information to enhance their online distribution strategies and potentially increase revenue and guest satisfaction.

Keywords: Online distribution systems, Hotels, Hotel Revenue, Hotel Managers, Delhi (NCR)

Introduction
The typical meaning of hospitality is the pleasure of visitors, guests, or strangers, and the warm and hospitable front desk. Under one large industry, there are many other business segments that make up the hospitality sector. These include air and ground travel, hotel, food and drink, entertainment (sports, theatre, movies), and tourist destinations.

There have been pauses in the hospitality industry’s expansion during several significant historical periods, such as World War I, the financial crisis of 1929, and World War II (Lorde & Joseph, 2019). Events around the world such as the attack on the World Trade Center in New York City on September 11, 2001, the ongoing war in Iraq, the obvious risk of future terrorist attacks, and alarming health issues like SARS, BSE (bovine spongiform encephalopathy), West Nile virus, and Ebola virus marked the beginning of this century and caused a decline in international travel. Just a few years remain until the first quarter of the century is over, and another global health concern surfaces: COVID-19, or coronavirus disease arises. According to Chakraborty and Maity (2020), it is regarded as the greatest challenge to humanity since World War II and the most serious universal health disaster of the century. Due to a rise in both business and leisure travel, there is a high demand for guest rooms. Hotels rooms account for nearly half of their total revenue, with food and beverage and banquet services following closely behind. The hotel's primary source of income is MICE (Meetings, Incentives, Conferences, and Exhibitions), or business travelers. (Meshave & Gumaste, 2021).
Central reservation system in hotel front office operations

A computerized system called a central reservation system (CRS) is used to store and retrieve travel-related data and carry out related transactions. A central hub for managing and distributing a hotel's room inventory and services across various distribution channels, a central reservation system (CRS) is an essential part of the hotel and travel industries. Consistency and accuracy are ensured by enabling real-time updates of room availability, rates, and reservations. In order to facilitate travelers' access to and booking of rooms, CRSs enable hotels to establish connections with Global Distribution Systems (GDS), Online Travel Agencies (OTAs), and their own website booking engines. A hotel's ability to reach a wider audience and generate more revenue is greatly enhanced by this system, which makes it possible for them to manage their distribution strategies effectively, reach a larger market, and handle reservations with ease.

Online Distribution Systems (ODS)

In the modern hotel industry, online distribution systems are crucial. With the use of a variety of technologies and strategies, these systems help hotels reach a wider audience by efficiently managing their room inventory and services. The Property Management System (PMS), which serves as the main hub for reservation management, is essential to this. Hotels link their PMS to multiple distribution channels through Central Reservation Systems (CRS), guaranteeing real-time updates on room availability and prices. They partner with Online Travel Agencies (OTAs) and pay commissions in exchange for access to their large customer bases. Hotels simultaneously manage their own websites that are integrated with booking engines, providing a direct booking option and minimizing dependency on external platforms. Rate parity is essential, and channel managers assist in ensuring consistency across distribution channels.

Guest Experience with Room Booking

Customer satisfaction and business success are largely influenced by the latest developments in online distribution systems, particularly in the hotel and travel sectors. A great guest experience depends on a number of crucial elements. First and foremost, booking convenience is crucial, and a user-friendly interface makes this process easier. The provision of comprehensive and precise information, coupled with superior imagery and client testimonials, enables visitors to make well-informed decisions. Real-time availability updates help prevent overbooking and misrepresentation, and pricing transparency is essential to avoiding unpleasant surprises.

An empirical study is conducted by Johnson (2023) to understand the visitor encounter in internet allocation systems. This study focused at the attitudes and behaviors of users who book travel accommodations online through travel agencies. The findings shed light on factors that affect visitor satisfaction and loyalty, such as website design, data accuracy, customer service, and value for money.

Clark (2022) compared booking platforms in the hospitality industry to look into how guests perceive the quality of services provided by internet distribution systems. The findings revealed that the factors that influence visitors' perceptions of exceptional service are website functionality, ease of use, and transparency in terms of both pricing and policies.

Review of literature

Through online distribution networks, travelers can purchase their hotel stays, airline tickets, and other travel-related items. These platforms have completely changed the hospitality industry by providing quick and easy access to hotel details and booking options. Online distribution systems, according to Kim and Lee (2016), expedite the hotel booking process and enable visitors to compare features and prices across numerous properties, thereby increasing visitor satisfaction.

Online travel agencies (OTAs), another popular type of online distribution system, allow customers to make reservations for hotels, flights, and other travel-related services directly from their website. Online travel agencies (OTAs) have reportedly had a significant impact on the hospitality industry by lowering
entry barriers for these activities and facilitating consumers' access to hotel information and booking services (Xiang and Ma, 2017). A hotel's website is an essential component of its online distributed generation (Li and Liang, 2017) since it provides quick access to the hotel's information and ordering capabilities. However, businesses run the risk of losing clients to rival online distribution strategies if they fail to make their portals easily navigable and accessible to a wide range of users.

**Different attributes of ODS and their experience**

Chen, Y., Gao, H., and Qu, H. (2017) looked into how customers' booking decisions and degree of confidence in hotels are affected by online reviews. The authors draw the conclusion that each of these factors is significantly impacted by online reviews, with positive reviews increasing booking intentions and trust and negative reviews decreasing them. Chen and colleagues highlight the importance of efficiently managing online reviews to guarantee that they accurately reflect the experiences of specific visitors.

Researchers Ukpabi, D., and Karjaluoto, H. (2017) studied the factors that influence consumers' choices to book hotels online. The authors conclude that perceived ease of use, perceived utility, social influence, and trust are important factors influencing the uptake of online booking. They also highlight how important it is for hotels to provide their customers with simple, easy-to-use online booking experiences in order to gain their trust.

Chinese tourists who are traveling overseas have their online information search habits and purchase intentions examined by Xiang, Z., Du, Q., and Ma, Y. (2017). The authors conclude that consumers' intentions to make a purchase are greatly influenced by their perceptions of the accessibility and usefulness of online information sources, and that this effect is mediated by consumers' perceptions of these sources. Furthermore, Xiang and colleagues stress the significance of hotels offering accurate and trustworthy information through internet distribution channels to increase guest loyalty and customer satisfaction.

Goel and Gupta, (2020) evaluated the effect of internet distribution channels on the hotel business in the Delhi-NCR. The writers focus on the elements that are important when a hotel decides which channels to use. The authors come to the conclusion that channel selection is heavily influenced by elements including pricing, customer exposure, and brand trust. In addition, Goel and Gupta emphasize that for hotels to reach their maximum potential, efficient management of online sales channels is essential.

Jindal and Kaur (2019) explored the advantages and disadvantages of using various channels and analyzed the effects of online distribution platforms on the prosperity of hotel businesses in Delhi NCR. It was concluded that hotels with active digital distribution marketing are more likely to have full rooms, higher revenue per available room and happy customers. In order for hotels to realize their full potential, efficient management of online retail channels is required.

**Hotel revenue generated through online room reservation platforms**

Lee, H. T., and Kim, J. H. (2016) The impact of internet distribution on hotel profitability is examined in Kim and Lee's paper. It has been demonstrated that hotels using internet distribution channels have higher occupancy rates and higher revenue per available room than hotels not using such channels. Furthermore, the authors stress how important it is to effectively manage online distribution channels in order to maximize the profit on their work.

The 2012 study by Xie et al. explored that hotels must use data analytics and dynamic pricing strategies to optimize revenue from online distribution channels. It is crucial to comprehend the unique characteristics of the different online distribution channels and tailor revenue management strategies to each one specifically.
Sheng and Chen (2016) looked at the relationship between Chinese internet travelers' intention to use hotel websites for reservations and the quality of those websites. The authors' findings indicate that the quality of a website significantly and favorably influences the intention to make an online reservation. As a result, hotels should prioritize the design, functionality, and usability of their websites in order to boost the number of online reservations.

Lee and Kim (2016) examined the impact of internet distribution on hotel profitability in Kim and Lee's article. It has been demonstrated that hotels using internet distribution channels have higher occupancy rates and higher revenue per available room (RevPAR) than hotels not using such channels. Furthermore, the authors stress how important it is to effectively manage online distribution channels in order to maximize the profit on their labor.

A study in year 2012 by Xie et al. focused on hotel revenue management strategies revealed that the use of dynamic pricing strategies and data analytics is necessary for hotels to maximize their revenue via online distribution channels. It is very crucial to comprehend the unique characteristics of the many online distribution channels and tailor revenue management strategies to each one specifically.

**Research Methodology**

The present study was undertaken to see if the online distribution systems of room reservation had any influence on increasing revenue of selected hotels in Delhi (NCR). In order to accomplish this objective a null hypothesis $H_0$ "The experience of attributes of online distribution systems has no positive impact on increase in hotel revenue in selected hotels of Delhi (NCR)" was developed and tested. The study was conducted offline, involving the collection of data from 112 hotel managers employed in 56 different star-rated hotels located in the Delhi National Capital Region (NCR). To gather the necessary information, a survey questionnaire written in English was developed and pilot tested on 33 randomly selected managers before conducting the full-scale study. This questionnaire encompassed inquiries about the managers' demographic characteristics, statements related to the attributes of online distribution systems, and the influence of these attributes on increasing hotel revenue. The pilot study aimed to assess the feasibility of the measurement items and enhance the research design. After making some minor adjustments to the variables, the questionnaire was distributed to 139 respondents using a combination of convenience sampling and snowball sampling techniques. All completed questionnaires were rigorously reviewed to identify missing values, incompleteness, or any instances of incorrect completion. It was discovered that 27 out of the 139 questionnaires exhibited such inconsistencies. Consequently, these problematic questionnaires were excluded from further analysis to ensure the accuracy and meaningfulness of the results. Thus, the final sample size considered for the subsequent analysis comprised 112 respondents.

Moreover, in an effort to mitigate the possibility of common method bias, as suggested by Podsakoff et al. (2003), which might arise from inconsistencies in measurement methods, measurement items, or the survey's design structure, Harman's single-factor test was employed. The test revealed that the percentage variance associated with common method bias was only 2%, falling well below the established threshold value of 50%. This result suggested that there were no significant issues of common method variance in the dataset.

In order to accomplish the study’s objective, the testing of hypothesis $H_0$ was done in two steps. First step involved application of an exploratory factor analysis (EFA) on 27 attribute of experience of online distribution systems from hotel manager’s perspectives to narrow down these attributes into new dimensions. In the second step, the impact of the newly generated factors on increase in revenue of selected hotels of Delhi (NCR) was determined using a multiple regression analysis.

**Data analysis and results**

The exploratory factor analysis (EFA) was conducted on 27 attributes of experience of online distribution systems in star category hotels in Delhi (NCR) to reduce them into broader dimensions. After that, principal component analysis was used as the extraction technique for the factor analysis. To
maximize the sum of variance of the squared component loading, Varimax rotation with Kaiser normalisation was chosen. The Kaiser-Meyer-Olkin (KMO) test was used to determine the proportion of variance shared by the variables. The results showed that the variables had a sufficient amount of shared variation because the KMO value (.732) was larger than 0.7 and very close to 1.0. Additionally, Bartlett's test of sphericity's p-value was determined to be significant (p < .05), indicating the presence of correlations between variables.

The result extracted 9 new factors with a cutoff of Eigen value1.0 that explained 68.82 % of variance among the variables. These 8 new factors extracted (table 1) were termed as: F1 (Ease of access), F2 (User friendly), F3 (Time saving and Efficient), F4 (Discounts, offers and cheap booking prices), F5 (Payment security and guest problem solution), F6 (Privacy of customer transactions and updated information), F7 (Guest reviews help to select the right hotel), F8 (Detailed review contents) and F9 (Protection of guest’s personal and financial data).

Table 1: Rotated Component Matrix with factor loadings

<table>
<thead>
<tr>
<th>Attributes of experience of Online distribution systems</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
</tr>
<tr>
<td>Reviews by other guest’s helps in choosing the hotel as per their level of services</td>
<td>.755</td>
</tr>
<tr>
<td>The after sale services are far better if guests make the reservation through hotel websites</td>
<td>.735</td>
</tr>
<tr>
<td>Guests always get solution for their problems very easily using ODS</td>
<td>.715</td>
</tr>
<tr>
<td>We arrange or help in managing all the requirements of the guests</td>
<td>.657</td>
</tr>
<tr>
<td>No need to give complete information at the time of making reservation</td>
<td>.610</td>
</tr>
<tr>
<td>Hotel’s websites provide the summarized graph of all the guest’s review from where guests get to know the hotel’s real rating</td>
<td>.602</td>
</tr>
<tr>
<td>Booking made by hotel’s websites are more secure</td>
<td>.591</td>
</tr>
<tr>
<td>Provision of accurate information of accommodation (Room availability, Room Pictures)</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Score</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>The websites of online distribution systems are well organized and attractive</td>
<td>.786</td>
</tr>
<tr>
<td>Guests can find what they want at minimum no. of clicks</td>
<td>.684</td>
</tr>
<tr>
<td>Guests can go to exactly what they want quickly</td>
<td>.542</td>
</tr>
<tr>
<td>They use multimedia features like hotel videos, properly</td>
<td>.535</td>
</tr>
<tr>
<td>The search options on websites are very helpful</td>
<td>.514</td>
</tr>
<tr>
<td>The websites of online distribution systems saves time as well</td>
<td>.731</td>
</tr>
<tr>
<td>All search categories are well arranged</td>
<td>.710</td>
</tr>
<tr>
<td>ODS platforms provide reliable &amp; genuine review contents</td>
<td>.594</td>
</tr>
<tr>
<td>Easy approach &amp; more convenient</td>
<td>.527</td>
</tr>
<tr>
<td>Different Promotions / Discount offers are the major reasons for Booking</td>
<td>.689</td>
</tr>
<tr>
<td>Very good properties are available at a very reasonable price</td>
<td>.645</td>
</tr>
<tr>
<td>Booking assurance at cheaper price</td>
<td>.637</td>
</tr>
<tr>
<td>It assures the payment security</td>
<td>.822</td>
</tr>
<tr>
<td>Solution of guest’s problems 24*7</td>
<td>.790</td>
</tr>
<tr>
<td>ODS platforms guarantee the privacy of customer transactions</td>
<td>.802</td>
</tr>
</tbody>
</table>
Guests get up to date information of the accommodation & other facilities offered

The volume of negative & positive reviews helps guests to select the right Hotel

ODS provide the detailed review contents which would attract more attention

Guest’s personal and financial data are well-protected on the websites

In order to assess the impact of the newly discovered and named variables on increasing hotel revenue, a multiple regression analysis was conducted at a 95% confidence level. But prior to performing the regression analysis, the data underwent a thorough examination to ensure that it met all the essential assumptions of regression analysis. These assumptions included the absence of outliers, the normal distribution of the data, data linearity, homoscedasticity (constant variance), and the absence of autocorrelations. A detailed analysis of residual statistics indicated that the minimum value of the standard residual was -2.129, while the maximum value was 3.434 suggesting that the collected data exhibited minimal instances of outliers.

Figure 1: Histogram, Normal P-P plot and Scatterplot for Multiple Regression between attributes of experience of Online distribution systems and increase in hotel revenue
The bell-shaped and symmetrical histogram for the regression standard residual (figure 1) and the normal P-P plot for the regression standard residual both provided evidence that the residuals were distributed normally. The data met the requirements of linearity and homoscedasticity, as shown by the scatterplot (figure 1) with a random assortment of dots that showed a straight-line linear relationship between the variables and a constant variance of the residuals in the regression model. The value of Durbin Watson test result was 1.356, which was closer to 2 and demonstrated that the residuals did not exhibit any autocorrelation.

To determine the impact of attribute of experience of Online distribution systems on increase in hotel revenue, a multiple regression was used after validating the data for hypothesis. Variable "Experience of attributes of Online distribution systems has a significant positive impact on increasing hotel revenue" was used as the dependent variable, with the nine new factors discovered through factor analysis acting as independent variables.

It was found that the regression model having $R^2 = .489$, contained all the 9 significant factors that describe 57.1% of the total variance in increase in hotel revenue from attributes of experience of Online distribution systems. Furthermore, the value of F-statistic $[F (9, 102) = 10.828, p < .05]$ was significant with p-value = 0.000 which indicates that the model was statistically significant. In the regression model, the value of sum of squares of mean was 11.551 and the value of sum of squares of residual was 12.090, indicating that model explained a significant amount of variance in establishing the impact of attributes of experience of online distribution systems on increase in hotel revenue.

Table 2: Model summary of individual impact of attributes of experience of Online distribution systems on increase in hotel revenue

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta (β)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>3.983</td>
<td>.033</td>
<td></td>
<td>122.442</td>
<td>.000</td>
</tr>
<tr>
<td>F1 (Ease of access)</td>
<td>.168</td>
<td>.033</td>
<td>.364</td>
<td>5.145</td>
<td>.000</td>
</tr>
<tr>
<td>F2 (User friendly)</td>
<td>.192</td>
<td>.033</td>
<td>.416</td>
<td>5.877</td>
<td>.000</td>
</tr>
<tr>
<td>F3 (Time saving and Efficient)</td>
<td>.112</td>
<td>.033</td>
<td>.244</td>
<td>3.442</td>
<td>.001</td>
</tr>
<tr>
<td>F4 (Discounts, offers and cheap booking prices)</td>
<td>.094</td>
<td>.033</td>
<td>.205</td>
<td>2.890</td>
<td>.005</td>
</tr>
</tbody>
</table>
Now to see the individual impact of attribute of online distribution systems on increase in hotel revenue, values of standardized coefficients beta and t values of the regression model were observed (Table 2).

The p-value (0.000) of the slope coefficients of t statistics (122.442) was found to be less than 5% significance level (p=.000) which meant that significant relationship was observed between the attributes. By looking into the values of standardized coefficients it was found that, attribute “F2 (User friendly)” had the highest influence \( \beta = .416, t (111) = 5.877, p= .000 \) on increase in hotel revenue followed by attribute “F1 (Ease of access) \( \beta = .364, t (111) = 5.145, p= .000 \); “F3 (Time saving and Efficient)” \( \beta = .244, t (111) = 3.442, p= .001 \); “F5 (Payment security and guest problem solution)” \( \beta = .240, t (111) = 3.391, p= .001 \) and attribute “F4 (Discounts, offers and cheap booking prices)” \( \beta = .205, t (111) = 2.890, p= .005 \).

The attributes not having any significant impact on increase in hotel revenue were attribute “F6 (Privacy of customer transactions and updated information)” \( \beta = .137, t (111) = 1.935, p= .056 \); “F7 (Guest reviews help to select the right hotel)” \( \beta = -.056, t (111) = -.784, p= .435 \); “F8 (Detailed review contents)” \( \beta = .034, t (111) = .479, p= .633 \) and attribute “F9 (Protection of guest’s personal and financial data)” \( \beta = .029, t (111) = .404, p= .687 \).

Additionally, 5 out of 9 variables had significant p-values (p = 0.05), demonstrating a substantial association between the experiences of online distribution systems and increase in hotel revenue. As a result, the findings of the multiple regression analysis suggested that, in the opinion of hotel managers, the attributes of online distribution system experience had a significantly positive impact on increase in hotel revenue in selected hotels in Delhi (NCR). As a result, our null hypothesis \( H_0 \), which stated that "The experience of attributes of online distribution systems has no positive impact on increase in hotel revenue in selected hotels of Delhi (NCR)" was rejected for 5 out of 9 variables.

**Conclusion**

In conclusion, the present study aimed to investigate the influence of online distribution systems on the revenue of selected hotels in Delhi (NCR). The research involved the development and testing of a null hypothesis, which stated that the attributes of online distribution systems had no positive impact on increasing hotel revenue. The study collected data from 112 hotel managers in 56 different star-rated hotels and utilized a survey questionnaire to assess various attributes of online distribution systems and their impact on revenue. The study underwent a rigorous data validation process, which included the use of common method bias assessment and exploratory factor analysis (EFA) to reduce the 27 attributes into nine distinct factors. Subsequently, a multiple regression analysis was conducted to determine the impact of these factors on increase in hotel revenue.

The analysis revealed that five out of the nine variables showed significant associations with hotel revenue and had a positive impact on increasing hotel revenue, thus rejecting the null hypothesis for these factors. The attribute "User-friendly" attributes had the most substantial impact on increase in hotel revenue, followed by "Ease of access" "Time-saving and efficiency" "Payment security and guest problem solution," and "Discounts, offers, and cheap booking prices." However, attributes "Privacy of
customer transactions and updated information” “Guest reviews help to select the right hotel" "Detailed review contents" and "Protection of guest's personal and financial data" were not found to have a significant impact on revenue.

In summary, the findings of this study provide valuable insights for hotel management and the online distribution systems industry, highlighting the specific attributes that can enhance hotel revenue. These results underscore the importance of user-friendliness, ease of access, efficiency, payment security, and attractive discounts and offers in driving revenue growth for hotels. Furthermore, these findings offer guidance for making informed decisions about online distribution strategies, potentially leading to increased revenue and improved guest satisfaction for selected hotels in Delhi (NCR).

References


