The London Municipal Swimming Complex

Introducing a new Pricing and Allocation Strategy

SMM641 Revenue Management and Pricing

Niiara Aliieva, Nathaniel Martin, Bodour Alshaikh, Marius Kiefer

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Introduction

The London Municipal Swimming Complex (LMSC), situated in central London, attracts an average of 160 customers daily. Customers can book a lane in one of the two swimming pools, which together offer 20 lanes per hour, with each time slot lasting 60 minutes. Currently, the business model for the LMSC is first come first serve with set prices of £7 for individual lane booking and £20 for group lane booking. The company has already set group booking prices based on the average number of people using the swimming lane as a group. This option is often used by both advanced swimmers and beginners for individual swim lessons. During the week the demand for early and late time slots, which represent peak periods, exceeds the pool's capacity, leading to the need to turn away customers. Customers are able to visit the LMSC from 08:00 until 18:00 every day of the week. On weekdays, demand peaks and exceeds capacity between 11:00 and 16:00. The company brought our team on board with the objective of enhancing their daily revenue streams. Our focus is to analyze their current operations, identify opportunities for growth, and implement strategies that drive measurable improvements.

Considering that the company is currently turning away customers and there are noticeable variations in demand across different time slots, we have decided to enhance the existing pricing strategy by introducing peak and non-peak pricing differentiation. We identify an opportunity to charge higher prices during busy hours while maintaining the current pricing for time slots that do not reach full capacity. To establish peak pricing, we gather data on customers' willingness to pay (WTP) through a survey conducted with past patrons. A total of 1,000 individuals provided us with their willingness-to-pay (WTP) data, covering both single and group bookings. A group booking generates nearly three times the revenue of a single booking. Using this information, we implement a second strategy by setting a booking limit for single bookings. This approach prioritizes group bookings, thereby increasing revenue, particularly during peak hours. Since turning away group bookings results in greater revenue loss compared to single bookings, this adjustment is also designed to maximize the company's profitability. Together, these strategies aim to enhance the complex's profitability while ensuring efficient use of the available lanes.

Methodologies

As the initial step, we reached out to past customers with a request to participate in a survey, asking them to provide information on the prices they are willing to pay for each available time slot. We collected responses from 500 individuals for single bookings and 500 individuals for group bookings. This data is crucial, as it helps us gain valuable insights into customer preferences and price sensitivity for both types of bookings. By gathering this information, we aim to refine our pricing strategy, optimize our offerings, and ultimately enhance overall revenue generation.

In this analysis, we employed price optimization to determine peak pricing based on customers' willingness to pay and, consequently, create a surplus for each customer. This method enables the maximization of revenue while considering customer preferences and demand patterns. Price optimization allows us to set prices effectively by aligning them with the varying levels of WTP across different customer segments. During peak periods, when demand exceeds the available capacity, we increase prices to capture higher revenue from customers who are willing to pay more for the service. Conversely, during non-peak times, lower prices are maintained to accommodate customers who are less sensitive to pricing but still value the service. The core of the method lies in the surplus, which is the difference between what a customer is willing to pay and the price they are actually charged. For example, if a customer is willing to pay £20 for a swimming lane but is charged £15, the surplus is £5. By implementing this pricing strategy, we ensure that we capture the maximum surplus from customers during peak times without pricing out those who might have a lower WTP. This approach enhances overall revenue by optimizing prices based on customer behavior. The price optimization model offers a more strategic pricing framework, enabling greater revenue generation during peak times compared to the existing pricing structure.

After implementing a new pricing strategy, we addressed the second issue of inefficient lane allocation by introducing booking limits for single bookings. Capacity allocation through booking limits is an effective method to maximize revenue, particularly during high-demand swimming pool time slots. With an hourly capacity of 20 lanes, this strategy prioritizes higher-revenue group bookings over single bookings, thereby increasing overall profitability. Demand estimates for single and group bookings were derived from historical company data and supplemented by survey results. We modeled these estimates using a Poisson distribution to account for variability in customer arrivals. Since group bookings generate nearly three times the revenue of single bookings, reserving lanes for group bookings is essential to boost revenue potential. During peak hours, we suggest introducing a booking limit for single bookings. Let's assume, out of the 20 lanes available, the company reserves 7 lanes for single bookings in the future, leaving the remaining 13 lanes exclusively for group bookings (only effective in peak hours). This setup ensures that group bookings are not displaced by lower-revenue single bookings, safeguarding the revenue associated with group usage. By prioritizing group bookings while maintaining a limited capacity for single bookings, this strategy enhances lane utilization and significantly improves daily revenue.

Results

There is significant improvement in revenue potential through the implementation of a peak and non-peak pricing strategy with booking limits. The first-come first-serve (FCFS) model currently used at the swimming complex was analyzed to understand its revenue potential. During weekdays, this approach generated a total daily revenue of £1301.63 (Table 1a). The highest revenue came from the 15:00–16:00 slot, which brought in £161.92, while quieter periods like 11:00–12:00 and 12:00–13:00 only generated £95.95 each. With flat pricing applied to all time slots (£7 for single bookings across all time slots and £20 for group bookings), the model does not take advantage of peak demand periods. As a result, the complex misses opportunities to increase revenue during busier times when demand is at its highest.

By introducing peak pricing and booking limits, weekday daily revenues increased to £1847.30 (Table 1b). High-demand periods, such as 08:00–09:00 and 17:00–18:00, generated £285.31 each, which significantly boosted overall earnings. Booking limits were used to manage lane availability, giving priority to group bookings during busy times. For example, during the 09:00–10:00 slot, the booking limit was set at 13, ensuring lanes were filled while prioritizing high-revenue customers. This strategy balanced demand effectively and allowed the complex to capture more revenue without turning away group bookings.

During weekends, the FCFS model produced slightly better results than on weekdays, with daily revenue reaching £1372.64 (Table 2a). Weekend demand peaks between 11:00 and 16:00, reflected in the higher revenues during these hours. For instance, the 11:00–12:00 slot generated £167.14. However, time slots like 17:00–18:00 still underperformed, bringing in only £82.95. The complex struggled to maximize revenue from the increased weekend demand without price adjustments for peak and off-peak times, leaving potential earnings untapped during busy hours.

The introduction of peak pricing and booking limits on weekends increased total daily revenue to £1972.58 (Table 2b). The 13:00–14:00 slot stood out, generating £299.56, the highest revenue across all periods analyzed. Strategic booking limits, such as allowing 11 bookings during this slot, helped balance lane usage and accommodate group bookings. Meanwhile, off-peak times, such as 17:00–18:00, earned £82.96 with adjusted pricing. This approach allowed the complex to increase revenue during peak hours while maintaining access for customers during quieter times, making better use of available lanes.

With the implementation of peak pricing and booking limits, weekday revenue increased by 42% compared to the initial first-come, first-serve model, rising from £1301.63 to £1847.30. Peak time slots like 08:00–09:00 and 17:00–18:00 brought in significantly higher earnings. Weekend revenue saw a 44% increase, going from £1372.64 under the FCFS model to £1972.58. High-demand periods, such as 13:00–14:00, generated the most income. By prioritizing group bookings during peak hours and controlling lane availability, the swimming complex achieved greater revenue growth while addressing demand variations across different time slots.

Time Slot	Revenue (£)
08:00-09:00	141.42
09:00-10:00	148.02
10:00-11:00	149.80
11:00-12:00	95.95
12:00-13:00	95.95
13:00-14:00	109.57
14:00-15:00	109.57
15:00-16:00	161.92
16:00-17:00	148.02
17:00-18:00	141.42
Total Revenue	**1301.63**

(a) Lower Bound for Expected Revenue (FCFS) Per Time Slot on Mn-Fr

Time Slot	Revenue (£)	Booking Limit
08:00-09:00	285.31	12
09:00-10:00	271.09	13
10:00-11:00	154.09	16
11:00-12:00	95.95	18
12:00-13:00	95.95	18
13:00-14:00	109.64	18
14:00-15:00	109.64	18
15:00-16:00	169.22	15
16:00-17:00	271.09	13
17:00-18:00	285.31	12
Total Revenue	**1847.30**	

(b) Expected Revenue and Booking Limits Per Time Slot on Mn-Fr

Table 1: Comparison of Revenue Estimates and Booking Strategies for Mn-Fr

Time Slot	Revenue (£)
08:00-09:00	95.95
09:00-10:00	128.95
10:00-11:00	156.96
11:00-12:00	167.14
12:00-13:00	159.62
13:00-14:00	144.57
14:00-15:00	148.02
15:00-16:00	152.57
16:00-17:00	135.92
17:00-18:00	82.95
Total Revenue	**1372.64**

(a) Lower Bound for Expected Revenue (FCFS) Per Time Slot on St/Sn

Time Slot	Revenue (£)	Booking Limit
08:00-09:00	95.95	18
09:00-10:00	129.12	16
10:00-11:00	158.67	15
11:00-12:00	270.06	13
12:00-13:00	285.13	12
13:00-14:00	299.56	11
14:00-15:00	271.09	13
15:00-16:00	241.97	16
16:00-17:00	138.08	18
17:00-18:00	82.96	19
Total Revenue	**1972.58**	

(b) Expected Revenue and Booking Limit Per Time Slot on St/Sn

Table 2: Comparison of Revenue Estimates and Booking Strategies for St/Sn

Recommendations

Based on the analysis, implementing a peak and non-peak pricing system to better align charges with customer demand is recommended. During busy hours, such as 08:00–09:00 and 17:00–18:00 on weekdays and 11:00–16:00 on weekends, higher prices should be applied to maximize revenue from customers willing to pay more for lane access. Non-peak times can maintain the current pricing to attract cost-sensitive customers and ensure steady lane usage throughout the day.

We also suggest introducing booking limits, especially during peak hours, to prioritize group bookings. Group bookings generate nearly three times the revenue of individual bookings and should be given priority during high-demand slots. For example, reserving 7 out of 20 lanes for group bookings during peak hours ensures efficient use of lanes while leaving capacity for individual swimmers. This strategy prevents low-revenue individual bookings from displacing more profitable group bookings.

LMSC should continue collecting data on WTP, demand patterns, and price sensitivity. This data will enable more accurate price adjustments based on consumer behavior, ensuring both peak and non-peak prices capture the consumers with highest surplus

while maintaining affordability for customers.
Integrating choice data into this framework allows LMSC to find booking preferences, better segment customers, and refine personalized pricing strategies. By understanding how different customers respond to pricing, LMSC can fine-tune both peak and non-peak prices to optimize surplus captured across all segments. Additionally, booking limits ensure the protection of lanes for higher-revenue bookings during peak hours, avoiding displacement by lower-revenue segments, and maximizing overall lane utilization.

Limitations

While our analysis has helped identify opportunities for improving revenue, however it comes with certain limitations.

One such limitation is that customers fit strictly into two categories: individuals and groups. In practice, this distinction may not always be clear. For instance, a small group could choose to book as individuals to reduce costs, or an individual might join a group booking for convenience. Additionally, there may be hybrid cases, such as families or swim teams, that do not fit neatly into either category. This simplification may fail to capture the full range of customer behaviour, which could affect the accuracy of pricing strategies and the projections for potential revenue improvements.

Furthermore, we assume that customers show up right at the start of each hour and that everyone gets a lane. This does not accurately represent the realities of how things function in a practical context. People might arrive at different times throughout the hour, not just at the beginning. Some might also leave if they can't book their preferred slot, which means lost revenue that isn't accounted for. Ignoring these factors may make the results less accurate, as it doesn't fully capture how customer behavior and lane availability affect the overall operations.

The current group booking system does not fully reflect the actual needs of group bookings, which could impact lane usage and overall revenue. Larger groups typically require more resources (lockers, showers, changing rooms etc.) or occupy multiple lanes, yet the pricing model remains the same regardless of group size. This uniform approach may overlook potential opportunities to charge higher rates for larger groups that use more space or time. Without adjusting prices to reflect group size, the strategy may fail to capture additional revenue that could be earned.

These limitations/simplifications mean that the model might not fully reflect real-world behaviour, and the outcomes of the proposed changes could differ from expectations.