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Function-space Revenue Management: A Case Study from Singapore

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Abstract
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Hotels can apply revenue-management systems to their function spaces—and boost the revenue contribution from those spaces.

BY SHERYL E. KIMES AND KELLY A. MCGUIRE

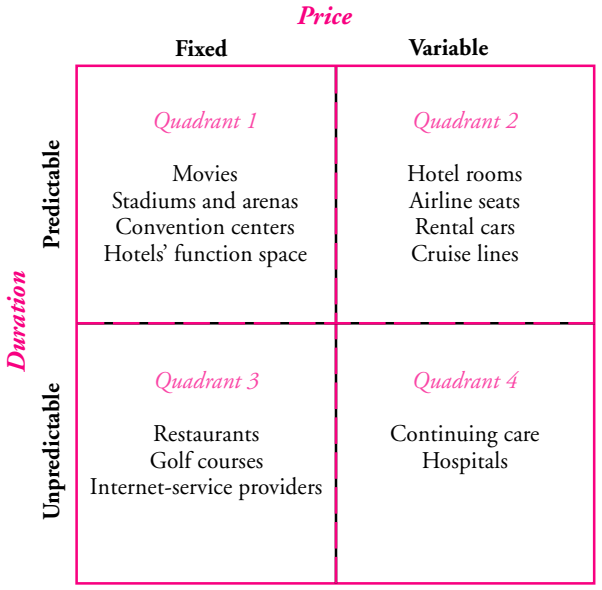
Revenue management, also known as yield management, is commonly applied to hotels' guest-room inventories, but the practice has not yet been systematically applied to hotels' function spaces.[1] Hotels' function spaces provide substantial income that could be enhanced by applying revenue-management, as we explain in this article.

As is the case in all revenue-management applications, the goal of function-space revenue management is to maximize the revenue contribution of each function space for each time period that the space is available. The measure we apply for this purpose is contribution per available space for a given time (ConPAST). Hotel managers can manipulate price and event duration to affect this measure. ConPAST has the following three components: contribution, space, and time. We suggest that measuring contribution is preferable to measuring revenue because revenue alone doesn't account for the varying profit margins arising from renting function spaces. Space refers to the number of square feet or meters in the function room, and time refers to the time segment for which the revenue contribution is measured. In this paper, we explain how we developed a revenue-management strategy for the Raffles City Convention Center at the Swissôtel Stamford and Raffles Plaza in Singapore. (While those properties are now managed by Swissôtel, at the time of our study the hotels were managed by Westin.)

[1] Jerry Hartley and Peter Rand, "Conference-sector-capacity Management," in *Yield Management for the Service Industries,* second edition, ed. Ingold, McMahon-Beattie, and Yeoman (London: Continuum, 2000), pp. 315–338.

EXHIBIT 1

A Typology of Revenue Management



A version of this diagram was previously used in: Sheryl E. Kimes, "Revenue Management on the Links: Applying Yield Management to the Golf-course Industry," *Cornell Hotel and Restaurant Administration Quarterly,* Vol. 41, No. 1 (February 2000), p. 127; and most recently in: Lawrence R. Weatherford, Sheryl E. Kimes, and Darren A. Scott, "Forecasting for Hotel Revenue Management: Testing Aggregation Against Disaggregation," *Cornell Hotel and Restaurant Administration Quarterly,* Vol. 42, No. 4 (August 2001), p. 54.

Revenue-management Review

Revenue management is the application of information systems and pricing strategies to match customers with services at an appropriate time and price. A common formulation of revenue management is selling the right capacity (in this case, function space) to the right customer at the right place at the right time.[2] The determination of "right" in this instance entails achieving both the most contribution possible for the hotel in renting a function space while also delivering the greatest value or utility to the customer for the reservation and use of that space. In practice, revenue management has meant setting prices according to predicted demand levels so that price-sensitive customers who are willing to purchase at off-peak times can do so at favorable prices, while price-insensitive customers who want to purchase at peak times will be able to do so. The application of revenue management has been most effective when it is applied to operations that have relatively fixed capacity, demand that is variable and uncertain, perishable inventory, appropriate cost and pricing structures, and varying customer price sensitivity.[3] Those attributes are found in the business of renting hotels' function space.

Different industries are subject to different combinations of duration control and variable pricing (see Exhibit 1).[4] Industries traditionally associated with revenue management (e.g., hotels, airlines, car-rental firms, and cruise lines) are able to apply variable pricing for a product that has a specified or predictable duration (Quadrant 2). On the other hand, sellers of function space, movie theaters, performing-arts centers, and arenas charge a fixed price for a product of predictable duration (Quadrant 1), while restaurants and golf courses charge a fixed price but face a relatively unpredictable duration of customer use (Quadrant 3). Many health-care businesses charge variable prices (e.g., Medicare versus private pay), but cannot predict the duration of patient use, even though some may try to control that duration (Quadrant 4). The lines dividing the quadrants are broken because in reality no fixed demarcation point exists between any of the quadrants. Thus, a given enterprise (such as renting function space) may have attributes from more than one quadrant.

Successful revenue-management applications are generally found in Quadrant-2 industries, because they can manage both capacity and price. To obtain the benefits associated with revenue

[2] Barry C. Smith, John F. Leimkuhler, and Ross M. Darrow, "Yield Management at American Airlines," *Interfaces,* Vol. 22, No. 1 (January–February 1992), pp. 8–31.

[3] See: Sheryl E. Kimes, "Yield Management: A Tool for Capacity-constrained Service Firms," *Journal of Operations Management,* Vol. 8, No. 4 (November 1989), pp. 348-363; and Robert G. Cross, *Revenue Management* (New York: Broadway Books, 1997). See also: Robert G. Cross, "Launching the Revenue Rocket: How Revenue Management Can Work for Your Business," *Cornell Hotel and Restaurant Administration Quarterly,* Vol. 38, No. 2 (April 1997), pp. 32–43.

[4] Sheryl E. Kimes and Richard B. Chase, "The Strategic Levers of Yield Management," *Journal of Service Research,* Vol. 1, No. 2 (November 1998), pp. 156–166.

management, industries outside of Quadrant 2 should attempt to emulate Quadrant-2 businesses by deploying the appropriate strategic levers (for example, by controlling duration). This implies that Quadrant-1 businesses, such as renting function space, should concentrate on developing demand-based pricing approaches. This is not to say that duration management cannot be improved, but only that most of the benefits associated with revenue management will be obtained from differential pricing.

In the next sections we review some of the options available for managing meeting-space duration, revenue, and demand.

Function-space Revenue Management

Managing function-space revenue is more difficult than dealing with transient guest rooms because of the interaction of function space with room sales and food and beverage demand. While function space will reap most of its revenue-management benefits from pricing, this is not to downplay the role of duration control.

Duration control. Duration can be managed in four ways: refining the definition of duration, reducing arrival uncertainty, reducing duration uncertainty, and reducing the amount of time between functions.[5] Each is briefly described and the issues associated with each discussed.

Definition of duration. Most hotels define function-space duration by day part, but the definition and number of day parts varies by hotel. Since events can span multiple day parts or use only a fraction of a day part, we suggest that hotel function-space managers define duration as an hour. Most computerized systems track this information, but it may be difficult to retrieve. If it's impossible to track the function-room schedule by the hour, tracking by day parts will work, as we demonstrate below.

Arrival uncertainty. Arrival uncertainty involves two factors: **(1)** the timing and quantity of requests, and **(2)** the no-show and cancellation rates of booked events. Determining the timing and number of requests from different market segments is a challenging task. Hotels still have a great deal of difficulty with forecasting their demand for group rooms, and most have not even attempted to forecast their function-space demand.[6] If a hotel can obtain information on the lead time and the amount of business of major market segments, it can make better decisions regarding the level of demand from key customers, when that demand will occur, and when to release space to other market segments.

While hotels have a difficult time in forecasting function-space demand, they do a good job of reducing cancellation and no-show rates by requiring nonrefundable deposits and prepayments for function space. In some high-demand cities, hotels even require prepayment for the requested number of guest rooms connected to the function-space reservation. This practice protects those hotels from holding room blocks that no one picks up at the agreed-on rate.

Duration uncertainty. Since events can span multiple days or day parts, hotels must ensure that the guest rooms associated with the event do not unnecessarily displace higher-paying transient business and must also ensure that the event lasts for the agreed-on length of time. The prepayment that we just mentioned also helps ensure that the contracted function space is used for the required length of time. However, hotels have a much more difficult time ensuring that the guest rooms will be occupied for the specified length of time. Many groups, particularly conventions, suffer from high room attrition on the last day or two of the event. If group members check out early, the hotel is usually stuck with an empty room, unless the hotel also imposes early departure fees or requires prepayment for all rooms. Then again, early departure fees and room prepayments may incur customers' wrath.

Turnaround time. In high-demand periods, the time needed to turn the room around can affect the hotel's ability to meet demand. Hotels that try to minimize the labor costs associated with set-up and tear-down often end up turning down business that could have been accommodated if the hotel had employed a sufficient number of employees to turn over the room. For ex-

[5] *Ibid.*

[6] Sheryl E. Kimes, "Group Forecasting Accuracy for Hotels," *Journal of the Operational Research Society,* Vol. 50, No. 11 (November 1999), pp. 1104–1110.

ample, a hotel that requires a two-hour set up and two-hour break-down for all events would not be able to book a meeting that ends at 5:00 in the same room with a dinner that begins at 6:30. If more employees were assigned to speed the transition between events, however, the labor cost would be more than covered by the increased revenue associated with the incremental event.

Pricing. Function-space pricing is complicated by the fact that function space cannot be priced without considering its effect on room sales and food and beverage. A price that may seem too low for the function space when considered alone may be more than compensated for when room and food and beverage revenue are considered. Similarly, a high function-space price may ultimately be unprofitable for the hotel if it occasions a low guest-room rate and displaces potentially higher-paying business from the transient rooms.

Function-space managers face two pricing decisions: what price to charge and how to determine who pays which price. When analyzing which business to accept, the manager must assess the days and day parts requested, the number of function rooms required, the expected number of guest rooms sold, and the expected sales of food and beverage, as well as other items. Since the profit margins for different revenue streams vary, the manager must determine the expected contribution associated with each event and compare that with any potential displacement of other business. If the expected contribution is higher than the potential displacement, the group should be accepted. Otherwise, its business should be declined or referred to another day or day part.

Along with determining the appropriate price to charge, the hotel must also justify the prices charged to different clients. Rate fences can be used to determine who pays which price. So-called "physical" rate fences might include the presence of certain amenities (e.g., high-tech rooms command a premium) or location (e.g., rooms on the first floor command a premium). Non-physical rate fences might include customer characteristics (e.g., repeat customers receive a discount), transaction characteristics (e.g., customers who book events through the internet receive a discount), or day of week or time of day (e.g., customers who book events for weekends or mornings receive a discount).

RM Program for Function Spaces

To develop a revenue-management program for function spaces, managers should:

(1) establish the baseline of performance,
(2) understand the drivers of that performance,
(3) develop a revenue-management strategy,
(4) implement that strategy, and
(5) monitor the strategy's outcome.[7]

In the following sections, we will discuss how we developed a revenue-management program for the Raffles City Convention Center at the Swissôtel Stamford and Raffles Plaza hotels in Singapore. We will conclude the case study with a discussion of the steps a hotel should take to implement function-space revenue management.

The Case of the Raffles City Convention Center

The Raffles City Convention Center (RCCC) at the Swissôtel Stamford and Raffles Plaza in Singapore will be used to demonstrate how revenue management can be applied to function space.[8] The RCCC is reasonably typical of a convention hotel's function space. The convention center occupies a 70,000-square-foot space on the hotel's fourth floor, comprising 18 function rooms ranging in size from 20-person meeting rooms to the Raffles Ballroom, which holds over 1,000 people for a sit-down dinner. The three ballrooms (Raffles Ballroom, Atrium Ballroom, and Stamford Ballroom) drive convention, wedding, and social revenue, while three sets of meeting rooms (the Executive Conference Center, Plaza Meeting Rooms, and Stamford Meeting Rooms) handle demand for small meetings and conference breakout sessions. Each of the ballrooms can be divided into three sections, and the Plaza and Stamford Meeting Rooms also can

[7] Sheryl E. Kimes, "Implementation of Restaurant Revenue Management: A Five-Step Approach," *Cornell Hotel and Restaurant Administration Quarterly,* Vol. 40, No. 3 (June 1999), pp. 15–22.

[8] Much of this section comes from: Kelly A. McGuire, "Function-space Revenue Management: A Case Study of the Raffles Convention Center at the Westin–Singapore," Cornell University School of Hotel Administration, unpublished monograph, 2001.

be divided. Two high-tech rooms provide projection and sound equipment for executive meetings. Foyer space is used for registration and coffee breaks.

The director of marketing for the hotel oversees the four sales groups, which are divided among weddings, conventions and exhibitions, meetings, and dinners and dances. Each sales group has its own director and team of sales managers. Each subgroup director is responsible for setting the sales targets for her team, and all four directors work together to set prices for the next year. A catering-sales analyst, who reports directly to the director of revenue management, works with all four sales groups. Her primary responsibilities are to oversee the programming and administration of the Delphi catering- and sales-system software and to generate reports and analyses.

The Raffles City Convention Center drives guest-room sales at the Swissôtel Stamford and Raffles Plaza, and the function space is frequently sold at a reduced rate to generate room-nights. This arrangement is not atypical for a hotel of this size. The hotel has 2,000 rooms, divided into three main sections: the Stamford, and the North and South Towers of the Plaza. Compared to the Plaza's towers, the Stamford is a lower-rated property in terms of décor and amenities offered, but at 70 stories it is the tallest hotel in the world. The Plaza is more upscale than the Stamford. The South Tower has recently been renovated and commands a considerable rate premium. Plans have been made to renovate the North Tower, and eventually the Stamford itself will be upgraded.

The function-space market in Singapore is divided into two segments: convention centers and hotels. Singapore has two convention centers: Suntec City, located three blocks from the RCCC, and the Expo Center, which is near the airport, or about 25 kilometers from downtown. The major-hotel market includes Marriott, Hyatt, Hilton, Pan Pacific, and the Oriental, all located within a few kilometers of the Swissôtel Stamford and Raffles Plaza.

The RCCC considers its primary competitive set to be the two convention centers—chiefly, Suntec City. Until Suntec City was built, the RCCC had the largest function space in downtown Singapore. Neither Suntec City nor the Expo Center has guest rooms of its own, however, so RCCC competes by focusing on its ability to provide the services of a full-service hotel, in addition to its function space. Because they have so many guest rooms, the Swissôtel Stamford and Raffles Plaza's secondary competitive set includes other hotels in Singapore. However, the RCCC is nearly double the size of any of those hotels' function space, which forms a point of differentiation compared to the other hotels.

Step 1: Establish a Baseline

The first step in implementing a revenue-management system for a property's function space is to establish the baseline performance for that space. Baseline-performance measures should include both performance characteristics of the meeting space and demand behavior of the various market segments. The performance measurements should include both occupancy and our proposed revenue-contribution factor (i.e., contribution per available space-time). These should be applied to the entire space, each room type, each day of week, and each day part. Demand behavior should include information on the demand patterns and booking patterns for each market segment by month, by day of week, and by day part.

When analyzing space performance, hotels should look to the traditional measures used for tracking guest-room sales: occupancy and RevPAR. With few exceptions, hotels track occupancy on a daily basis, and most hotels also track their RevPAR. Very few hotels know the occupancy of their function space and even fewer know their ConPAST.

Occupancy. Function-space occupancy is tricky to calculate because a single room can be divided (or not) and the appropriate time unit must be determined. As we indicated above, we believe that the best time unit to use in calculating function-space occupancy is one hour, but most hotels do not have sufficiently accurate data for a calculation at this level. Because of this, the most practical time unit is the day part. The number of day parts per day varies by hotel, but it is usually related to the number of times each day that a function space can be sold. Most hotels use two or three day parts per day for each function space.

EXHIBIT 2

PM Occupancy for November and December 2000

Facility	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Atrium Ballroom	52%	38%	71%	48%	81%	89%	100%	69%
ECC: Bailey	33%	38%	50%	56%	67%	33%	33%	44%
ECC: Bras Basah	44%	63%	44%	39%	56%	56%	44%	49%
ECC: Orchard	56%	50%	54%	48%	70%	59%	33%	53%
ECC: Wilberforce	0%	63%	75%	56%	67%	56%	33%	49%
Plaza rooms	28%	53%	72%	69%	83%	81%	61%	64%
Raffles Ballroom	67%	42%	42%	44%	52%	89%	85%	61%
Stamford Ballroom	111%	63%	56%	72%	106%	89%	133%	91%
Stamford meeting room	22%	23%	42%	41%	44%	43%	39%	36%

Function-space occupancy can be calculated by dividing the number of day parts used by the number of day parts available. For example, if a hotel has ten function rooms and three day parts per day, its monthly capacity available (assuming a 30-day month) would be 900 day parts (10 × 3 × 30). If the hotel sold a total of 450 day parts of function space in a month, its occupancy would be 50 percent.

With that calculation in mind, we obtained detailed information on functions booked at these Singapore hotels from their Delphi system for November 2000 through May 2001. We excluded coffee breaks in our calculation of occupancy and contribution figures, to reduce the possibility of double counting room use.

We used just two day parts, AM (before 5:00 PM) and PM (after 5:00 PM). On that basis, we tracked daily occupancy for each major meeting area (Atrium Ballroom, ECC rooms, Plaza meeting rooms, Raffles Ballroom, Stamford Ballroom, and Stamford meeting rooms).

As mentioned previously, all of the meeting areas in our convention center can be divided into smaller spaces (except for those in the ECC). To calculate the rooms' occupancy, we expressed each meeting space as a percentage of the total space for that particular venue. For example, the hotel has four Plaza meeting rooms, so each of those rooms was considered as 25 percent of the total. The number of times a specific room was booked was multiplied by that percentage and added to the values for the other individual rooms to determine the total number of events booked in that type of space. Thus, if two of the individual Plaza meeting rooms were occupied, the occupancy for the overall Plaza meeting rooms was 50 percent, and if three of the rooms were occupied, the occupancy was 75 percent. Using this rubric, if the dividers were not in use for a particular space, its occupancy was by definition 100 percent for that particular day part. The only exception to this rule is how we treated the rooms in the Executive Conference Center. Since the ECC rooms cannot be combined into one space, we calculated the occupancy for each of those rooms separately.

As indicated in Exhibits 2 and 3, PM occupancy was much higher than AM occupancy in November and December. Exhibit 2 shows that overall (total) PM occupancy ranged from 36 percent in the Stamford meeting rooms to 91 percent in the Stamford Ballroom. Occupancy also varied by day of week. For example, the occupancy of the popular Stamford Ballroom ranged from 56 percent on Tuesdays to 133 percent on Saturdays (indicating that it was turned more than once during the PM day part). As the table in Exhibit 3 shows, overall AM occupancy ranged from 3 percent in the Raffles Ballroom to 48 percent in the Bailey Meeting Room (one of the ECC rooms). Occupancy tended to be a bit higher during the week than on weekends.

Ballroom occupancy. Since the ballrooms could be divided, we tracked the occupancy of both the ballroom parts and each entire ballroom. As hoteliers know only too well, when one division of a ballroom is booked, the entire space cannot then be rented—just the other section(s). This factor created intriguing occupancy patterns. The Stamford Ballroom, for instance, had a higher occupancy when the entire space was rented as a unit. On the other hand, the Atrium Ballroom and Raffles Ballroom had higher weekday occupancies when they were sold as divisible spaces on weekdays, but as the entire space on weekends.

ConPAST. As we suggest above, hotels should also calculate each space's contribution per available space-time to determine that space's contribution to operating profit. Again, we argue that

contribution is preferable to revenue because of the varying profit margins of the different streams of function-space revenue. For example, food and beverage expenditures usually have a contribution margin of 30 to 35 percent, while room rental may have a contribution margin of 85 to 95 percent, and AV rentals may have a contribution margin ranging from 50 to 95 percent. Relying only on revenue generation (as opposed to contribution) can lead hotel managers to develop unprofitable selling patterns.

Contribution should be calculated by space (either square feet or square meters) because this measurement provides a standard for the comparison of different types of rooms and room configurations. For example, if a hotel has a divisible ballroom and finds that the ConPAST is higher when the room is divided than when it is sold as one space, it should direct its marketing efforts at smaller groups or ensure that larger groups are charged a premium.

Most hotels have information on their guestrooms' competitive performance, but very few have information on the competitive performance of their function space. In some North American markets, HotelRevMax™ provides this information. For example, if a hotel has a monthly ConPAST of $5 and its competitive set has a monthly ConPAST of $4, its yield index would be 1.20 ($5/$4).

The contribution per available space-time was calculated by dividing the contribution per day part (AM and PM) by the amount of space (number of square feet) for each meeting room type (see Exhibits 4 and 5 on the next page).

In the PM day part, the Raffles Ballroom had by far the highest overall ConPAST ($4.21), followed by the Stamford Ballroom at $0.73. The ConPAST of the Raffles Ballroom was highest on Fridays ($5.59), Saturdays ($7.71), and Sundays ($4.81). Mondays were low, at $1.90.

The AM day part had an extremely low ConPAST across the board (Exhibit 5). The Executive Conference Center had the highest overall ConPAST ($0.24), followed by the Plaza meeting rooms ($0.17).

Demand behavior. Information on the demand and booking behavior of each market segment should be tracked and analyzed. Demand behavior includes both functions that were booked (constrained demand) and those that were turned down (unconstrained demand). Booking behavior shows how far in advance particular market segments make their reservations. Information on booking behavior can help hotels better forecast sales and improve decisions on when to release space to different market segments.

EXHIBIT 3

AM Occupancy for November and December 2000

Facility	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Atrium Ballroom	0%	29%	29%	30%	33%	11%	26%	22%
ECC: Bailey	33%	38%	75%	56%	67%	33%	33%	48%
ECC: Bras Basah	33%	50%	25%	44%	22%	22%	11%	30%
ECC: Orchard	56%	25%	4%	48%	41%	44%	30%	36%
ECC: Wilberforce	0%	63%	63%	56%	56%	56%	33%	46%
Plaza rooms	17%	31%	47%	58%	47%	47%	22%	39%
Raffles Ballroom	0%	4%	4%	0%	0%	11%	4%	3%
Stamford Ballroom	28%	31%	25%	17%	28%	17%	44%	27%
Stamford meeting room	19%	15%	33%	33%	41%	39%	26%	30%

Constrained and unconstrained demand. As with guest-room reservations, hotels need information on both the constrained and unconstrained demand for function space.[9] To review this topic, the level of constrained demand can be determined from actual sales, while unconstrained demand can be estimated by declined reservations, or the requests that could have been accommodated if the hotel had unlimited space. We observe that most hotels do a poor job of tracking unconstrained demand, but such information is essential for understanding the true nature of demand. Take the case of a convention that occupies a hotel's entire function space for a week. Had other groups wished to book space during that time, they would have been turned down due to space constraints. If function-space

[9] See: Eric Orkin, "Wishful Thinking and Rocket Science: The Essential Matter of Calculating Unconstrained Demand for Revenue Management," *Cornell Hotel and Restaurant Administration Quarterly,* Vol. 39, No. 4 (August 1998), pp. 15–19.

EXHIBIT 4

PM ConPAST

Facility	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Atrium Ballroom	$0.36	$0.06	$0.24	$0.15	$0.34	$0.46	$0.66	$0.33
ECC	$0.36	$0.21	$0.25	$0.29	$0.30	$0.65	$0.42	$0.36
Plaza rooms	$0.21	$0.32	$0.27	$0.22	$0.34	$0.38	$0.39	$0.30
Raffles Ballroom	$4.81	$1.90	$2.47	$4.17	$2.35	$5.59	$7.71	$4.21
Stamford Ballroom	$1.11	$0.49	$0.28	$0.48	$0.70	$0.79	$1.18	$0.73
Stamford meeting room	$0.21	$0.09	$0.16	$0.15	$0.17	$0.14	$0.18	$0.16

EXHIBIT 5

AM ConPAST

Facility	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Atrium Ballroom	$0.00	$0.04	$0.04	$0.05	$0.06	$0.02	$0.06	$0.04
ECC	$0.29	$0.17	$0.11	$0.26	$0.15	$0.47	$0.19	$0.24
Plaza rooms	$0.18	$0.17	$0.19	$0.19	$0.13	$0.11	$0.19	$0.17
Raffles Ballroom	$0.02	$0.21	$0.16	$0.18	$0.00	$0.01	$0.09	$0.09
Stamford Ballroom	$0.17	$0.14	$0.08	$0.06	$0.04	$0.03	$0.17	$0.10
Stamford meeting room	$0.20	$0.06	$0.16	$0.13	$0.17	$0.10	$0.12	$0.13

biased future allocation decisions because they lack information about the business that was turned down.

Unconstrained demand can be divided into denials and regrets. Denials are customers who are turned away because of capacity constraints or restrictions. For example, if a function space is not available, or if sufficient guest rooms are not available, the hotel may be forced to decline the request for event space. Regrets are customers who are turned down because they are not inclined to pay the price of the space or a room (i.e., shoppers). Those inquiries may not be a true representation of customers who intended to book. For this reason, it is more important to track denials than to be concerned about regrets.

Tracking unconstrained demand implies that sales managers must tally the number of denials and the number of regrets. Unless an automated tracking system can be developed, it is unlikely that accurate information will be captured.

Booking behavior. Information on how far in advance various market segments make their bookings can help hotel managers improve their forecasting and can also help them decide when to release space to different market segments. For example, most hotels have a conflict between catering sales and food and beverage, as the two departments attempt to book the same space. If sufficient booking information were available, managers would be able to make better decisions on which type of business to accept.

The booking curve shows the booking pace of each segment. Booking-curve data can be used to set holds and releases for function spaces and to give an indication of the comparative revenue performance of a particular month (i.e., are we behind or ahead of typical bookings?). The booking curves we developed were based on average revenue-on-hand (RevOH) for each month before arrival (MBA).

A steep booking curve indicates a fast booking pace while a gradual slope illustrates a slow and steady pace. Knowing the booking pace can help sales managers decide on release dates for spaces. Thus, if a sales manager knows that nearly all conventions are booked by 12 months before arrival, she can release all of the larger ballrooms that are not booked for conventions a year ahead of time, because it is unlikely that there will be additional requests for a convention.

A Look at Demand

The Swissôtel Stamford and Raffles Plaza serve five major market segments: convention and exhibition, meetings, weddings, social, and tours.[10] Except for tours, those market segments were relatively balanced in 2000. Social events had the largest percentage of total revenues that year (28 percent), while conventions were close behind at 24 percent. Weddings and meetings each provided 23 percent of the hotel's revenues, while tours contributed only 3 percent. We'll use the convention-and-exhibition and meetings segments to illustrate the use of demand and booking data.

[10] Much of this section comes from: McGuire, *op. cit.*

Conventions. Conventions are major revenue generators for the hotel, since they typically bring in a significant number of room-nights along with the function-space revenue and additional F&B sales. Since the events are so large and are booked far in advance, they form the cornerstone of the function-space use.

The convention-segment managers report that their peak month is October. The average number of covers per function for conventions in 2000 was 290. This average includes all breakout sessions and VIP luncheons, as well as the large convention banquets and exhibit-hall food service. Convention managers report an average length of stay of four days per convention. Most convention and exhibition events begin in the morning—most frequently at 9:00 AM.

The 2000 bookings for conventions and exhibitions started earlier than for other market segments (Exhibit 6). For instance, the hotel already had convention RevOH at 36 months before arrival. Half of the RevOH had been booked by 19 months before arrival and 90 percent had been booked by seven months before arrival.

Since 75 percent of all functions were booked by one year before the event, the property could begin to release unbooked space to other segments at the one-year point. At seven months before arrival it could release all remaining space, as few convention requests are likely to come in after that point.

Meetings. Although the percentage of total revenue of the meetings segment is close to that of conventions, meetings are usually smaller in size, with an average of only 69 covers per event. Many more meetings must be booked to generate revenues equivalent to those of conventions and exhibitions. For example, in 2000, 3,190 meeting events were booked, compared to 710 convention and exhibition events. Meetings typically last one day, occur during the week, and mainly comprise morning and afternoon sessions, each with a coffee break. Sales managers report peak seasons in October, November, and May. December, January, and July are off peak.

The meetings' booking curve stands in contrast to the booking curve for conventions (Exhibit 7). Relatively few meeting bookings occurred until six to eight months before arrival. So, just as convention bookings began to slow

EXHIBIT 6

Convention and exhibition booking curve

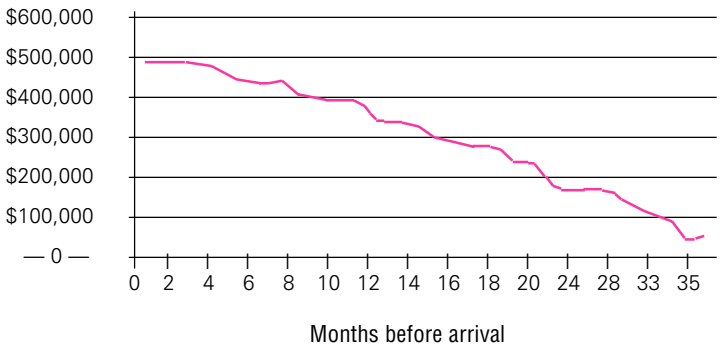
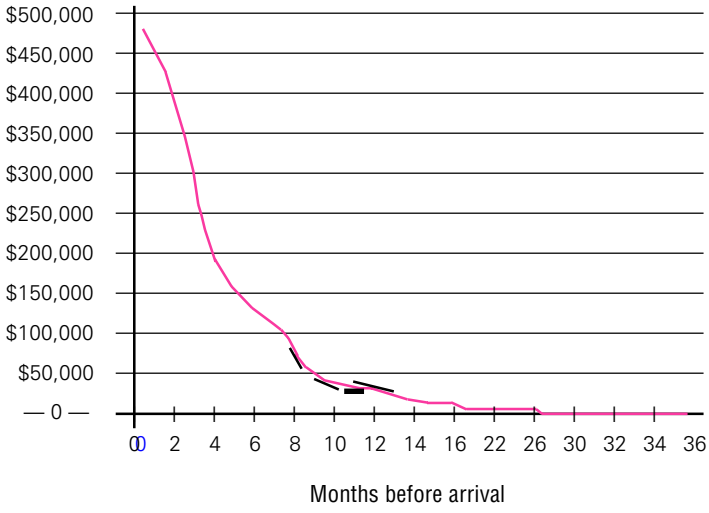


EXHIBIT 7

Meetings booking curve



down, meetings bookings started to pick up. Based on that analysis, hotel managers can be reasonably sure that they will get meeting requests until close to the actual event. The meetings business is a good complement to conventions, because the two segments have opposite booking patterns. Therefore, the hotel can turn away most meeting requests until seven months before arrival—which is about the time that the remaining convention space is released.

Understanding demand and booking patterns for each segment is important when developing an appropriate RM strategy. For example, it helps the hotelier determine which spaces to hold if she knows that weddings typically book weekend evenings, conventions book weekdays, and that both groups are similar in size. If a convention wanted to set up on a Sunday, which is a peak day for weddings, for example, the hotel could charge a premium fee for that privilege.

Step 2: Understanding Causes of Booking Behavior

Once the baseline has been established, managers must understand the causes behind past performance and must develop a revenue-management strategy to help improve performance. A thorough understanding of the internal and external environment of the hotel and its sales policies is essential for identifying performance drivers and for developing revenue-management strategies. Potential causes can be divided into internal and external factors.

Internal factors include:

(1) *Physical constraints*—Rooms may not be large enough for certain meetings or may have other limiting characteristics;

(2) *Labor availability*—The hotel may not have enough workers available to turn rooms around between events;

(3) *Sales incentives*—The sales-incentive system may preclude making good revenue-management decisions;

(4) *Incomplete data*—The data available may be inaccurate or difficult to obtain;

(5) *Guest-room availability*—Function-space requests often hinge on whether sufficient guest rooms are available; and

(6) *Prior bookings*—Other business may have already booked the space.

External factors include:

(1) *City-wide events*—Some city-wide events may be so large that it precludes having space available for other groups; and

(2) *Market conditions*—If the economic condition of the overall market has deteriorated, business from certain market segments may decrease.

An example of internal factor number six (above) occurred at the RCCC convention center in July 2000, when an extremely large convention used all of the hotel's function space. That booking resulted in the denial of requests from other customers. July is normally a slow month for conventions, but the large convention made July look like a good month.

The Atrium Ballroom may be an example of internal factor number one (above). That space recorded a much lower occupancy and ConPAST than did either the Stamford or Raffles Ballrooms. This weak performance may have been caused by the physical characteristics of the Atrium Ballroom. It has a low ceiling, which makes it less desirable for weddings and social events, and the space dividers are not soundproof, so that multiple small events cannot be booked into the space—that is, the Atrium can be rented either as a large space or a single small space, but not as multiple small spaces simultaneously.

Step 3: Developing a Revenue-management Strategy

Effective revenue management is predicated on the use of demand-based pricing in which full price is charged during high-demand periods, while discounted rates are available during low-demand periods. To apply demand-based pricing, it is essential to identify high- and low-demand periods for function space.

A simple approach to identifying and communicating high- and low-demand periods is to color code them on a table. This approach has been applied effectively in hotel rooms and restaurants.[11] For example, high-demand periods are designated as hot, or red; periods of moder-

[11] Sheryl E. Kimes, Deborah I. Barrash, and John E. Alexander, "Developing a Restaurant Revenue-management Strategy," *Cornell Hotel and Restaurant Administration Quarterly,* No. 40, Vol. 5 (October 1999), pp. 18–30.

ately high demand are designated as warm, or yellow; and low-demand periods are designated as cold, or blue. All other demand levels are classified as neutral and not colored at all.

Each demand level (or color) should have a different set of prices associated with it, based on qualified discounts with rate fences. The highest prices should always be available regardless of the demand level, but a variety of qualified discounts should be offered during other periods. A qualified discount implies that customers must meet some restriction (or rate fence) to receive the lower price. Companies use rate fences in an attempt to prevent price-insensitive customers from obtaining discounts that are not necessary to encourage their business. The rate fences are generally designed to screen out customers who are not eligible for discounts. Rate-fence rules include physical attributes of the room (e.g., high tech, good view), transaction characteristics (e.g., customers who prepay, those who book over a year ahead of time), customer characteristics (e.g., frequent purchasers, type of organization), or controlled availability (e.g., coupons or direct-mail offers).

The definition of demand levels is subjective and can be based either on occupancy or ConPAST. For example, at our Singapore properties, we designated occupancy rates over 80 percent as hot; those between 65 and 80 percent as warm; those less than 20 percent as cold; and the range of 20 to 64 percent as neutral. Alternatively, demand-level classifications can be based on ConPAST, but since the contribution from each function space varies, occupancy may be a better and more comparable measure.

AM Pricing Strategy

A key part of the RCCC management's revenue-management strategy was to grapple with the problem presented by the weak AM day part. Riddled with cold periods, this slow day part had no hot periods at all and just two warm periods (see Exhibit 8). The brightest spot was the Bailey Room, which displayed fairly high demand on Tuesdays and Thursdays. Given that this is the only strong point for this day part, the hotel should quote rack rate for this room. However, if the room's high occupancy comes from frequent customers or standing meetings, those custom-

EXHIBIT 8

AM demand levels

Facility	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Atrium Ballroom	0	29%	29%	30%	33%	11%	26%	22%
ECC: Bailey	33%	38%	75%	56%	67%	33%	33%	48%
ECC: Bras Basah	33%	50%	25%	44%	22%	22%	11%	30%
ECC: Orchard	56%	25%	4%	48%	41%	44%	30%	36%
ECC: Wilberforce	0	63%	63%	56%	56%	56%	33%	46%
Plaza meeting rooms	17%	31%	47%	58%	47%	47%	22%	39%
Raffles Ballroom	0	4%	4%	0	0	11%	4%	3%
Stamford Ballroom	28%	31%	25%	17%	28%	17%	44%	27%
Stamford meeting room	19%	15%	33%	33%	41%	39%	26%	30%

EXHIBIT 9

PM demand levels

Facility	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Atrium Ballroom	52%	38%	71%	48%	81%	89%	100%	69%
ECC: Bailey	33%	38%	50%	56%	67%	33%	33%	44%
ECC: Bras Basah	44%	63%	44%	39%	56%	56%	44%	49%
ECC: Orchard	56%	50%	54%	48%	70%	59%	33%	53%
ECC: Wilberforce	0%	63%	75%	56%	67%	56%	33%	49%
Plaza meeting rooms	28%	53%	72%	69%	83%	81%	61%	64%
Raffles Ballroom	67%	42%	42%	44%	52%	89%	85%	61%
Stamford Ballroom	111%	63%	56%	72%	106%	89%	133%	91%
Stamford meeting room	22%	23%	42%	41%	44%	43%	39%	36%

Key for the two tables above: **"hot"** "warm" "low"

ers would likely qualify for a discount. Customers interested in booking the Bailey Room who are extremely price-sensitive should either be steered towards another room or another day of the week.

During cold periods, managers should focus on filling the rooms by applying any appropriate discounts for groups requesting space. In addition, sales managers should use the information on low-demand periods to develop a marketing plan for generating business for those periods.

PM Pricing Strategy

Evenings were much busier at our Singapore conference center. This day part enjoyed several hot periods, most notably in the ballrooms (see Exhibit 9, on the previous page). The Atrium and Stamford Ballrooms, for example, were hot on Thursdays, Fridays, and Saturdays, and the Stamford Ballroom was hot on Sundays as well. The Plaza meeting rooms and the Raffles Ballroom were hot on Thursdays and Fridays. The hotel should be quoting only rack rate for those rooms during the hot periods. If customers are price sensitive and unwilling to pay full price, they should either be directed to another night of the week, to the AM day part, or to a "cooler" function room.

We believe that revenue management can help improve the profitability of hotel function space.

This analysis can highlight not only when to offer discounts, but when to boost rack rates. For example, we suggest that the extremely high occupancy of the Stamford Ballroom (sometimes even over 100 percent, indicating two turns during the day part) may indicate that the rates being charged for the hot periods are too low. Similarly, the Atrium Ballroom recorded a relatively low ConPAST, despite its high occupancy rates on Thursdays through Saturdays. Again, this outcome may indicate that the hotel is charging rates that are too low. Even though the Atrium Ballroom is due for renovation, it remains extremely busy.

Step 4: Implementation

For revenue management to be successful, hotel managers must ensure that the director of sales, sales managers, the director of catering, and the director of food and beverage clearly understand the purpose and practice of revenue management. This requires a position-specific training program that can help employees understand their role in revenue management and how revenue management can benefit both the hotel and employees. Additionally, managers should align employee-incentive and -evaluation programs to coincide with the objectives of revenue management.

Sales-incentive systems that reward achieving volume or revenue goals can lead to suboptimal profitability. When volume quotas are used, sales managers may book business regardless of its contribution. On the other hand, if revenue quotas are the target, sales managers may "pad" expected revenue with unprofitable add-ons. In addition, volume- and revenue-quota systems often lead to unproductive competitions between the sales managers of different market segments. The use of contribution quotas can help alleviate the above conflicts.

Some hotels have experimented with the concept of rewarding sales managers for booking business during low-demand periods. For example, business brought in during cold periods may count for three times as much as the business brought in during hot times, while business brought in during warm periods may count for twice as much as hot-period business.

Step 5: System Evaluation

As with any business practice, the hotel must apply a reliable measure for the performance of the revenue-management strategy. The success of a revenue-management system can be measured in three ways: ConPAST, the yield index, and the revenue-opportunity model. ConPAST can be monitored for growth, but may not be a reliable measure because of the complications arising from external market conditions. The yield index and the revenue-opportunity model can reduce the effects of market conditions on the model and give a clearer indication of performance.

North American hotels have long used the yield index to measure the success of their rev-

enue management of guest rooms, and could apply the same concept to function space. As described previously, the yield index is simply the ConPAST for an individual hotel divided by the ConPAST of its competitive set. As long as a hotel's ConPAST remains above one, it is outperforming its competition, regardless of market conditions. Competitive information is becoming available in many North American cities through the HotelFlash banquet reports available from HotelRevMax (www.hotelrevmax.com). The reports provide information on banquet-related food, beverage, and room rental per available room, per occupied room, per group room, and per square foot for the subject hotel and for its competitive set. However, hotels located in cities not covered by reports of that kind may find accurate competitive data difficult to obtain.

For a hotel to use the revenue-opportunity model, it must track the timing of both constrained and unconstrained demand. The revenue-opportunity model measures the following three variables: **(1)** the amount of contribution that would have been achieved if requests for space were accepted on a first-come-first-served basis, **(2)** the amount of contribution that could have been achieved if perfect information were available, and **(3)** the amount of contribution that was actually obtained.[12] The difference between the first-come-first-served revenue and the perfect revenue is referred to as the revenue opportunity. The performance of a revenue-management system is measured as a percentage of that ideal revenue opportunity that the hotel actually obtained. For example, assume a hotel would have made $20,000 if it had accepted function-space requests on a first-come-first-served basis, but would have made $25,000 if it had perfect information. Its revenue opportunity in this instance would be $5,000. If the revenue-management system led to a contribution of $22,000, the hotel would have earned 40 percent of its revenue opportunity ($2,000/$5,000).

A Five-step Approach

Function-space revenue-management is still in its infancy, but we believe that revenue management can help improve the profitability of hotel function space. In this paper, we attempted to demonstrate how that might occur by proposing a five-step approach for developing a function-space revenue-management strategy and applying that approach to the Raffles City Convention Center in Singapore. As function-space revenue management matures, more sophisticated forecasting and optimization approaches similar to those currently used for guest rooms will be developed, and hotel operators will become accustomed to measuring the occupancy and ConPAST of function space, just as they now refer to the occupancy and RevPAR of guest rooms.

Hotels that wish to develop a function-space revenue-management program should follow these five steps:

(1) *Establish a baseline.* Hotels must first determine the baseline performance of their function space. Baseline performance includes information on demand patterns, room-occupancy percentages, average rent per available square foot per day, and contribution per available square foot per day part.

(2) *Understand the causes.* After establishing the baseline performance, hotels must determine the possible causes of the performance. Understanding the causes of performance is important because it can help managers determine why certain things have occurred.

(3) *Develop a strategy.* We demonstrated a simple way to identify peak and non-peak days and day parts. Once that is in place, a hotel's managers can develop appropriate pricing strategies for each day part. In addition, the hotel can consider imposing length-of-stay controls for certain times, and determining the pricing and reasoning for the pricing by time of year, day of week, and time of day.

(4) *Implement the strategy.* Implementation is the most difficult part of revenue management. With function-space revenue management, managers must ensure that sufficient training of appropriate personnel is completed, that incentive and reward systems are aligned to match the

[12] Smith *et al.*, pp. 8–31.

goals of revenue management, and that information systems are positioned to provide the data necessary for decision making and performance measurement.

(5) *Monitor success.* Once revenue management has been implemented, hotels must monitor performance and compare it to the baseline performance. Several performance measurements exist, including the increase in revenue per available square foot, increase in yield index, and the revenue-opportunity gauge.

The intent of this paper was to discuss function-space revenue management by using the experience of a major operation in Singapore as an example to illustrate how a hotel can implement revenue management. We believe this article is just the beginning of what promises to be a successful and profitable approach to managing function space. Future developments will most likely include the sophisticated forecasting, optimization, and duration-control methods commonly found in revenue management for guest rooms. While more sophisticated methods hold great promise, a hotel will not be able to take full advantage of such methods unless it views its function space as a resource that can be profitably managed. ■

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