

## MARRIOTT ROOMS FORECASTING

“A hotel room is a perishable good. If it is vacant for one night, the revenue is lost forever.” Linda Snow was commenting on the issue of capacity utilization in the hotel business. “On the other hand, the customer is king with us. We go to great pains to avoid telling a customer with a reservation at the front desk that we don’t have a room for him in the hotel.”

As reservation manager of one of Marriott’s hotels, Snow faced this tradeoff constantly. To complicate the matter, customers often booked reservations and then failed to show, or cancelled reservations just before their expected arrival. In addition, some guests stayed over in the hotel extra days beyond their original reservation and others checked out early. A key aspect of dealing with the capacity-management problem was having a good forecast of how many rooms would be needed on any future date. It was Snow’s responsibility to prepare a forecast on Tuesday afternoon of the number of rooms that would be occupied each day of the next week (Saturday through Friday). This forecast was used by almost every department within the hotel for a variety of purposes; now she needed the forecast for a decision in her own department.

### Hamilton Hotel

The Hamilton Hotel was a large downtown business hotel with 1,877 rooms and abundant meeting space for groups and conventions. It had been built and was operated by Marriott Hotels, a company that operated more than 180 hotels and resorts worldwide and was expanding rapidly into other lodging-market segments. Management at the Hamilton reported regularly to Marriott Corporation on both occupancy and revenue performance.

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This case was prepared by Larry Weatherford, research assistant, under the supervision of Professor Samuel E. Bodily. It was written as a basis for class discussion rather than to illustrate effective or ineffective handling of an administrative situation. Copyright © 1989 by the University of Virginia Darden School Foundation, Charlottesville, VA. All rights reserved. *To order copies, send an e-mail to sales@dardenpublishing.com. No part of this publication may be reproduced, stored in a retrieval system, used in a spreadsheet, or transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without the permission of the Darden School Foundation.*

Hotel managers were rewarded for their ability to meet targets for occupancy and revenue. Snow could not remember a time when the targets went down, but she had seen them go up in the two years since she took the job as reservation manager. The hotel managers were continuously comparing forecasts of performance against those targets. In addition to overseeing the reservations office with eight reservationists, Snow prepared the following week's forecast and on Tuesday afternoon, she presented it to other department managers in the hotel. The forecast was used to schedule, for example, daily work assignments for housekeeping personnel, the clerks at the front desk, restaurant personnel, and others. It also played a role in purchasing and revenue, and cost planning.

## Overbooking

At the moment, however, Snow needed her forecast to know how to treat an opportunity that was developing for next Saturday. It was Tuesday, August 18, 1987, and Snow's forecasts were due by midafternoon for Saturday, August 22 through Friday, August 28. Although 1,839 rooms were already reserved for Saturday, Snow had just received a request from a tour company for as many as 60 more rooms for that night. The tour company would take any number of rooms less than 60 that Snow would provide, but no more than 60. Normally Snow would be ecstatic about such a request: selling out the house for a business hotel on a Saturday would be a real coup. The request, in its entirety, put reservations above the capacity of the hotel, however. True, a reservation on the books Tuesday was not the same as a "head in the bed" on Saturday, especially when weekend nights produced a lot of "no-show" reservations. "Chances are good we still wouldn't have a full house on Saturday," Snow thought aloud. "But if everybody came and someone was denied a room due to overbooking, I would certainly hear about it, and perhaps Bill Marriott would also!"

Snow considered the tradeoff between a vacant room and denying a customer a room. The contribution margin from a room was about \$90, since the low variable costs arose primarily from cleaning the room and check-in/check-out. On the other side, if a guest with a reservation was denied a room at the Hamilton, the front desk would find a comparable room somewhere in the city, transport the guest there, and provide some gratuity, such as a fruit basket, in consideration for the inconvenience. If the customer was a Marquis cardholder (a frequent guest staying more than 45 nights a year in the hotel), they would receive \$200 cash plus the next two stays at Marriott free. Snow was not sure how to put a cost figure on a denied room. In her judgment, it should be valued—good will and all—at about twice the contribution figure.

## Forecasting

Snow focused on getting a good forecast for Saturday, August 22, and making a decision on whether to accept the additional reservations for that day. She had historical data on demand for rooms in the hotel. **Exhibit 1** shows demand for dates starting with Saturday, May 23, 1987. (Saturday, August 22, was the beginning of week 14 in this database.) Demand figures included the number of turned-down requests for a reservation on a night when the hotel had stopped taking

reservations because of capacity, plus the number of rooms actually occupied that night. Also included in **Exhibit 1** is the number of rooms booked as of the Tuesday morning of the *week prior* to each date. (Note that this Tuesday precedes a date by a number of days that depends on the date's day of week. It is four days ahead of a Saturday date; seven days ahead of a Tuesday; ten days ahead of a Friday. Also, note that on a Tuesday morning, actual demand is known for Monday night, but not for Tuesday night.)

Snow had calculated pickup ratios for each date where actual demand was known in **Exhibit 1**. Between a Tuesday one week ahead and any date, new reservations were added, reservations were cancelled, some reservations were extended to more nights, some were shortened, and some resulted in no-shows. The net effect was a final demand that might be larger than Tuesday bookings (a pickup ratio greater than 1.0) or smaller than Tuesday bookings (a pickup ratio less than 1.0). Snow looked at her forecasting task as one of predicting the pickup ratio. With a good forecast of pickup ratio, she could simply multiply by Tuesday bookings to obtain a forecast of demand.

From her earliest experience in a hotel, Snow was aware that the day of the week (DOW) made a lot of difference in the demand for rooms, her recent experience in reservations suggested that it was key in forecasting pickup ratios. Downtown business hotels like hers tended to be busiest in the middle of the workweek (Tuesday, Wednesday, and Thursday) and light on the weekends. Using the data in **Exhibit 1**, she had calculated a DOW index for the pickup ratio during each day of the week, which is shown in the last column of **Exhibit 1**. Thus, for example, the average pickup ratio for Saturday is about 86.5% of the average pickup ratio for all days of the week. Her plan was to adjust the data for this DOW effect by dividing each pickup ratio by that factor. This adjustment would take out the DOW effect, and put the pickup ratios on the same footing. Then she could use the stream of adjusted pickup ratios to forecast Saturday's adjusted pickup ratio. To do this, she needed to think about how to level out the peaks and valleys of demand, which she knew from experience could not be forecasted. Once she had the forecast of adjusted pickup ratio, then she could multiply it by the Saturday DOW index to get back to an unadjusted pickup ratio. "Let's get on with it," she said to herself. "I need to get an answer back on that request for 60 reservations."

Exhibit 1

**Historical Demand and Bookings Data**

<u>Week</u>	<u>Dow Indicator</u>	<u>Demand</u>	<u>Tuesday Bookings</u>	<u>Pickup Ratio</u>	<u>Dow Index</u>
1	1	1,470	1,512	0.972	0.865
	2	870	864	1.007	0.911
	3	986	827	1.192	0.973
	4	1,247	952	1.310	1.013
	5	1,109	740	1.499	1.068
	6	1,197	908	1.318	1.123
	7	1,500	1,311	1.144	1.049
2	1	1,854	2,034	0.912	0.865
	2	1,489	1,584	0.940	0.911
	3	1,792	1,682	1.065	0.973
	4	1,708	1,684	1.014	1.013
	5	1,787	1,600	1.117	1.068
	6	1,314	1,077	1.220	1.123
	7	1,136	956	1.188	1.049
3	1	1,537	1,455	1.056	0.865
	2	1,132	1,001	1.131	0.911
	3	1,368	1,131	1.210	0.973
	4	1,488	1,151	1.293	1.013
	5	1,392	942	1.478	1.068
	6	1,321	884	1.494	1.123
	7	1,469	1,315	1.117	1.049
4	1	1,795	1,885	0.952	0.865
	2	1,780	1,963	0.907	0.911
	3	1,841	2,006	0.918	0.973
	4	1,774	1,855	0.956	1.013
	5	1,835	1,962	0.935	1.068
	6	1,847	2,019	0.915	1.123
	7	1,833	2,052	0.893	1.049
5	1	1,847	2,018	0.915	0.865
	2	1,680	1,706	0.985	0.911
	3	1,680	1,874	0.896	0.973
	4	1,798	1,827	0.984	1.013
	5	1,843	1,734	1.063	1.068
	6	1,322	1,124	1.176	1.123
	7	1,022	803	1.273	1.049

Exhibit 1 (continued)

<u>Week</u>	<u>Dow Indicator</u>	<u>Demand</u>	<u>Tuesday Bookings</u>	<u>Pickup Ratio</u>	<u>Dow Index</u>
6	1	1,298	1,356	0.957	0.865
	2	956	848	1.127	0.911
	3	1,236	966	1.280	0.973
	4	1,306	909	1.437	1.013
	5	1,176	798	1.474	1.068
	6	1,134	731	1.551	1.123
	7	1,164	869	1.339	1.049
7	1	1,486	1,372	1.083	0.865
	2	870	760	1.145	0.911
	3	1,392	1,144	1.217	0.973
	4	1,747	1,450	1.205	1.013
	5	1,861	1,739	1.070	1.068
	6	1,797	1,491	1.205	1.123
	7	1,719	1,477	1.164	1.049
8	1	1,729	1,801	0.960	0.865
	2	1,251	1,096	1.141	0.911
	3	1,682	1,605	1.048	0.973
	4	1,795	1,788	1.004	1.013
	5	1,814	1,836	0.988	1.068
	6	1,772	1,626	1.090	1.123
	7	1,885	1,479	1.275	1.049
9	1	1,924	2,105	0.914	0.865
	2	1,591	1,720	0.925	0.911
	3	1,727	1,554	1.111	0.973
	4	1,772	1,561	1.135	1.013
	5	1,748	1,563	1.118	1.068
	6	1,748	1,594	1.097	1.123
	7	1,643	1,708	0.962	1.049
10	1	1,765	2,086	0.846	0.865
	2	1,748	1,816	0.963	0.911
	3	1,795	1,668	1.076	0.973
	4	1,672	1,461	1.144	1.013
	5	1,345	1,027	1.310	1.068
	6	1,273	1,042	1.222	1.123
	7	1,600	1,442	1.110	1.049

Exhibit 1 (continued)

<u>Week</u>	<u>Dow Indicator</u>	<u>Demand</u>	<u>Tuesday Bookings</u>	<u>Pickup Ratio</u>	<u>Dow Index</u>
11	1	1,773	1,941	0.913	0.865
	2	1,292	1,401	0.922	0.911
	3	1,753	1,807	0.970	0.973
	4	1,805	1,681	1.074	1.013
	5	1,601	1,413	1.133	1.068
	6	722	599	1.205	1.123
	7	889	831	1.070	1.049
12	1	1,058	1,123	0.942	0.865
	2	887	952	0.932	0.911
	3	1,676	1,750	0.958	0.973
	4	1,775	1,777	0.999	1.013
	5	1,759	1,748	1.006	1.068
	6	1,093	932	1.173	1.123
	7	1,217	969	1.256	1.049
13	1	1,542	1,562	0.987	0.865
	2	988	1,004	0.984	0.911
	3	1,510	1,404	1.075	0.973
	4		1,657		
	5		1,643		
	6		1,124		
	7		1,074		
14	1		1,839		
	2		1,862		
	3		1,886		
	4		1,696		
	5		1,002		
	6		794		
	7		1,106		

DOW Indicator:

- 1 = Saturday
- 2 = Sunday
- 3 = Monday
- 4 = Tuesday
- 5 = Wednesday
- 6 = Thursday
- 7 = Friday