The Center for Hospitality Research
Hospitality Leadership Through Learning

Cornell Hospitality Report

Accurately Estimating Time-Based Restaurant Revenues Using Revenue per Available Seat-Hour

by Gary M. Thompson and Heeju (Louise) Sohn

Vol. 8, No. 9, May 2008

Cornell University
School of Hotel Administration

The Robert A. and Jan M. Beck Center at Cornell University
Back cover photo by permission of *The Cornellian* and Jeff Wang.

Cornell Hospitality Report,
Volume 8, No. 9 (May 2008)
Single copy price US$50

Cornell Hospitality Report is produced for the benefit of the hospitality industry by The Center for Hospitality esearch at Cornell University

David Sherwyn, *Academic Director*
Glenn Withiam, *Director of Publications*
Jennifer Macera, *Manager of Operations*

Center for Hospitality Research
Cornell University
School of Hotel Administration
537 Statler Hall
Ithaca, NY 14853

Phone: 607-255-9780
Fax: 607-254-2292
www.chr.cornell.edu

The Center for Hospitality Research

Hospitality Leadership Through Learning

Thank you to our generous Corporate Members

Senior Partners

American Airlines Admirals Club
General Growth Properties, Inc.
job.travel
Southern Wine and Spirits of New York
Taj Hotels Resorts Palaces
TIG Global LLC

Partners

AIG Global Real Estate Investment
Davis & Gilbert LLP
Deloitte & Touche USA LLP
Denihan Hospitality Group
Expedia, Inc.
Four Seasons Hotels and Resorts
Fox Rothschild LLP
HVS International
InterContinental Hotels Group
JohnsonDiversey
Jumeirah Group
LRP Publications
Marriott International, Inc.
Marsh's Hospitality Practice
Mobil Travel Guide
Nestlé
PricewaterhouseCoopers
Proskauer Rose LLP
Smith Travel Research
SynXis, a Sabre Holdings Company
Thayer Lodging Group
Travelport
WATG
WhiteSand Consulting

Friends

American Tescor, LLP • Argyle Executive Forum • Caribbean Hotel Restaurant Buyer's Guide • Cody Kramer Imports • Cruise Industry News • DK Shifflet & Associates • ehotelier.com • EyeforTravel • Fireman's Fund • 4Hoteliers.com • Gerencia de Hoteles & Restaurantes • Global Hospitality Resources • Hospitality Financial and Technological Professionals • hospitalityInside.com • hospitalitynet.org • Hotel Asia Pacific • Hotel China • HotelExecutive.com • Hotel Interactive • Hotel Resource • International CHRIE • International Hotel and Restaurant Association • International Hotel Conference • International Society of Hospitality Consultants • iPerceptions • KPMG Japan/Global Management Directions • Lodging Hospitality • Lodging Magazine • Milestone Internet Marketing • MindFolio • PKF Hospitality Research • RealShare Hotel Investment & Finance Summit • Resort+Recreation Magazine • The Resort Trades • RestaurantEdge.com • Shibata Publishing Co. • Synovate • The Lodging Conference • TravelCLICK • UniFocus • WageWatch, Inc. • WIWIH.COM

Accurately Estimating Time-Based Restaurant Revenues Using Revenue per Available Seat-Hour

by Gary M. Thompson and Heeju (Louise) Sohn

ABOUT THE AUTHORS

Gary M. Thompson, Ph.D., is a professor of operations management in the School of Hotel Administration at Cornell University, where he teaches graduate and undergraduate courses in service operations management (gmt1@cornell.edu). He joined Cornell in 1995. His current research focuses on restaurant capacity, wine cellars, scheduling conferences, course scheduling in post-secondary and corporate training environments, and workforce staffing and scheduling decisions. His research has appeared in the *Cornell Hotel and Restaurant Administration Quarterly, Decision Sciences, the Journal of Operations Management, Management Science, Naval Research Logistics, Operations Research,* and other journals. He has consulted for several prominent hospitality companies and is the founder and president of Thoughtimus® Inc., a small software development firm focusing on scheduling products. From July 2003 through June 2006 he served as Executive Director of the Cornell Center for Hospitality Research.

Heeju (Louise) Sohn is a candidate for a Master of Engineering degree in Operations Research (ORIE) at the School of Engineering, Cornell University. A 2007 graduate of the Cornell School of Hotel Administration, her main interest lies in studying the application of ORIE concepts and tools to improve hospitality operations (hs268@cornell.edu).

EXECUTIVE SUMMARY

By calculating revenue per available seat-hour, or RevPASH, restaurant managers can implement revenue management approaches to build their restaurant's profitability. The key to making this work is the appropriate calculation of RevPASH, in a way that captures accurately the effects of revenue, time, and capacity. Most RevPASH analyses are based only on the time at which a check is opened. Since the time needed for most meals crosses analysis periods (whether those periods are an hour, a half-hour, or less), assigning the entire RevPASH to the analysis period when the check is opened can create inaccurate analyses. Instead, as demonstrated in this report, a better approach would be to calculate RevPASH according to both check open and close times. The resulting revised RevPASH calculation accounts for the demand that customers place on restaurant capacity for the entire duration of their meals (and the revenue therefrom). Using eight months of data from one restaurant's POS, we find that the traditional approach works fine when RevPASH is calculated for the entire day part (in this case, the entire lunch period). The approach based only on check-opening times become less accurate, however, as the analysis periods are shortened. Even when the analysis periods are two hours long, the inaccuracy of the traditional approach exceeds 40 percent. Understanding the nature of this inaccuracy (and how to overcome it) is essential for managers who use RevPASH to guide their revenue enhancing decisions.

Accurately Estimating Time-based Restaurant Revenues Using Revenue per Available Seat-Hour

by Gary M. Thompson and Heeju (Louise) Sohn

In its simplest form, the goal of restaurant revenue management is to manage restaurant capacity and customer demand in a way that maximizes revenue for the restaurant. Decisions on capacity include the number of front-of-house and back-of-house employees to schedule, the kitchen equipment and its capacity, and the mix of tables. Demand-management decisions include off-peak discounts, reservation levels, and overbooking.

An essential measurement for restaurant revenue management is RevPASH, or revenue per available seat-hour, which was introduced in 1998.[1] This metric is useful, because it states revenue based on both time (hour) and capacity (seats). By tracking the RevPASH by day part, or even within day parts, the restaurant manager has a useful tool by which to measure performance and to guide his or her decisions to enhance revenue. For example, Kimes suggested that managers can reduce the dining duration at high RevPASH times and implement suggestive selling during low RevPASH periods.[2]

Our focus in this report is on making the most accurate possible calculation of RevPASH. In particular, we will demonstrate the considerable accuracy problems with the approach that has so far been used to calculate this statistic. In conjunction with that analysis, we introduce a new means of calculating RevPASH that overcomes the problems with the existing approach.

We first offer a brief summary of what has been written about restaurant revenue management, including the method presented for calculating RevPASH. We then present a simple example that illustrates the problem with the existing approach and introduce a more accurate means of calculating RevPASH. Next, we define a means of measuring the inaccuracy in the existing RevPASH calculation and demonstrate that inaccuracy using eight months of restaurant data. We close with a discussion of the implications of our findings and recommendations.

Research on RevPASH

Much has been written about restaurant revenue management in the ten years since the term was introduced, most of it by Sheryl E. Kimes at Cornell University and her collaborators. Precursor work, related to restaurant capacity, was done by restaurant consultant Brian Sill.[3]

The articles published by Kimes and her coauthors provide a comprehensive review of restaurant revenue management.[4] In particular the *Cornell Hospitality Report*, published by Cornell University's Center for Hospitality Research, "Restaurant Revenue Management," provides an excellent overview of the topic. We encourage readers to seek out that report, which is available free of charge.

---

1 Sheryl E. Kimes, Richard B. Chase, Sunmee Choi, Philip Y. Lee, and Elizabeth N. Ngonzi, "Restaurant Revenue Management: Applying Yield Management to the Restaurant Industry," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 39, No. 3 (June 1998), pp. 32-39.

2 Sheryl E. Kimes, "Implementing Restaurant Revenue Management: A Five-Step Approach," *Cornell Hotel and Restaurant Administration Quarterly,* Vol. 40, No. 3 (June 1999), pp. 16-21.

3 Brian T. Sill, "Capacity Management: Making Your Service Delivery More Productive," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 31, No. 4 (August 1991), pp. 77-87; and Brian T. Sill and Robert Decker, "Applying Capacity-Management Science: The Case of Browns Restaurants," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 40, No. 1 (February 1999), pp. 22-30.

4 See: Kimes (1999), *op.cit*; Sheryl E. Kimes, Deborah I. Barrash, and John E. Alexander, "Developing a Restaurant Revenue Management Strategy," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 40, No. 5 (October 1999), pp. 18-29; Sheryl E. Kimes, "Restaurant Revenue Management," *Cornell Hospitality Report*, Vol. 4, No. 2 (2004), p. 34 (chr.cornell.edu); and Sheryl E. Kimes, "Restaurant Revenue Management: Implementation at Chevys Arrowhead," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 45, No. 1 (2004), pp. 52-67.

Calculating RevPASH-Ent in Excel

Revenue per available seat-hour, RevPASH is a function of both time and capacity. The classic calculation of RevPASH is the outcome of dividing the revenue from checks opened in a particular time period by the number of seats available, and adjusting the value to an hourly rate. As discussed in the accompanying article, that calculation can be refined to express the revenue for the entire time period occupied for that meal (which we call RevPASH-Ent).

Here is an example of how to set up formulas in Excel to calculate RevPASH-Ent. This example assumes that the lunch period is being evaluated, using analysis intervals of 15 minutes. Begin by entering the data and formulas as shown here. The example shows only two checks, but you would use as many rows as you have checks for the period.

	A	B	C	D	E	F	G	H
1	Cover #	Check Open	Check Close	Check ($)	$/Min	11:30	11:45	12:00
2	1	11:40	12:26	$32.00	=d2/(1440*(c2-b2))	=max(1440*(min(g$1,$c2)-max($b2,f$1)),0)*$e2	(fill right)	(fill right)
3	2	11:51	12:47	$57.00	(fill down)	(fill down)	(fill down)	(fill down)

Next, copy the formula in cell e2 into cells e3, e4, etc. (i.e., down as many rows as are needed for the number of covers you have recorded). Then copy the formula in cell f2 into cells g2, h2, etc. (i.e., into as many columns as are needed to span the lunch period in your restaurant). Finally, copy cells f2, g2, h2, etc, down to rows 3, 4, 5 (i.e., down as many rows as you have covers). After entering these formulas (and formatting cells appropriately), you should see the following values in the cells:

	A	B	C	D	E	F	G	H
1	Cover #	Check Open	Check Close	Check ($)	$/Min	11:30	11:45	12:00
2	1	11:40	12:26	$32.00	$0.70	$3.48	$10.43	$10.43
3	2	11:51	12:47	$57.00	$1.02	$0.00	$9.16	$15.27

To find the RevPASH, simply sum the values in columns F, G, H (etc.) across the rows 2, 3, 4 (etc.), divide by the length of the analysis intervals (in this case 15 minutes), divide by the number of seats in the restaurant, and multiply by 60 minutes to convert it to an hourly rate.

Kimes, her coauthors, and other Cornell researchers have analyzed specific issues related to restaurant revenue management, including dining-duration management and table-mix management. An analysis of dining duration preferences of customers at casual restaurants in widely dispersed locations found that North Americans and Asians both prefer to spend less time at restaurants than do Europeans.[5] Looking at the service components of the meal, another study found that customers like some parts to proceed promptly, those being having their order taken and having their check delivered and payment processed, while they do not like to feel rushed when they are actually eating or lingering over their meal.[6]

A key issue in revenue management is to ensure that a restaurant's table mix matches its customer mix. Thompson (who is first author on this report) examined whether it is better to have tables that can be combined together to seat larger parties or a mix of dedicated table sizes, and found that for most restaurants the latter is preferable.[7] He later examined, for those restaurants using combinable tables, how those combinable tables should be deployed.[8] Kimes and Thompson investigated the best table mix for a specific restaurant[9] and later compared different approaches for finding table mixes, under a wide variety of simulated scenarios.[10]

As a time-based measure of restaurant revenue, RevPASH allows comparisons of different restaurants and allows managers to analyze specific day parts to facilitate actions to improve revenue.[11] For example, during periods of lower RevPASH, management can consider actions to attract more customers or encourage upselling, while during periods of high RevPASH management can consider raising prices or reducing meal durations.[12] We define the "analysis time intervals" as time periods used to track RevPASH and the "analysis time interval length" to be the length of those periods. So, for example, if RevPASH is tracked using consecutive 30-minute time intervals throughout the meal, the analysis time interval length equals 30 minutes.

In all of the articles we examined, we have been able to find only two instances where instructions were provided on how to calculate RevPASH. Both advocate capturing the revenue in the time period when the meal begins. That is, whenever the check is opened, the revenue from that meal is figured along with all other checks also opened in that time period. In 1999, for instance, Kimes and her coauthors stated: "To calculate hourly RevPASH, we first calculated the revenue from all the transactions that began during the hour and divided by the number of available seats."[13] Kimes and her coauthors used the same approach in a 2004 study, as follows: "Hourly revenue is defined as revenue from all checks opened during that hour."[14] For our purposes, we'll refer to that approach with the shorthand RevPASH-Opn, for RevPASH calculated based on the check open times.

Methods of Calculating Time-Based Restaurant Revenue

As we explain below, RevPASH-Opn is an accurate gauge of RevPASH when there is a single analysis time interval equal to the entire day part (i.e., meal period). What we found in the analysis described here is that RevPASH-Opn is inaccurate, often exceedingly so, when it is applied to short-duration analysis time intervals. A simple example will illustrate the difficulty. Let's say a 120-seat restaurant, containing 20 six-tops, is open for lunch from 11:00 AM to 2:00 PM, and management wishes to calculate RevPASH using hour-long analysis intervals. Further, let's assume that the average dining duration is 60 minutes, that 20 parties of four people each arrive and are seated at 12:30, and, finally, that the average check for each person spends is $10. Using the calculation of RevPASH-Opn, RevPASH would be zero in the hour from 11:00-12:00, $6.67 (= 20 parties, times 4 people per party, times $10 per person, divided by 120 seats, divided by one hour) for the 12:00-1:00 hour, and zero in the hour from 1:00-2:00. This result would suggest that there is an opportunity (or even a need) to raise revenue in the first and third hours. As you see, by recording all the revenue for the meal only at its start (when the check is opened), RevPASH-Opn misallocates the revenue that occurs in the second half of each customer's meal.

5 Sheryl E. Kimes, Jochen Wirtz, and Breffni M. Noone, "How Long Should Dinner Take? Measuring Expected Meal Duration for Restaurant Revenue Management," *Journal of Revenue and Pricing Management*, Vol. 1, No. 3 (2002), pp. 220-233.

6 Breffni M. Noone and Sheryl E. Kimes, "Dining Duration and Customer Satisfaction," *Cornell Hospitality Report*, Vol. 5, No. 9 (2005), p. 21 (chr.cornell.edu).

7 Gary M. Thompson, "Optimizing a Restaurant's Seating Capacity: Use Dedicated or Combinable Tables?" *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 43, No. 3 (2002), pp. 48-57.

8 Gary M. Thompson, "Optimizing Restaurant Table Configurations: Specifying Combinable Tables," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 44, No. 1 (2003), pp. 53-60.

9 Sheryl E. Kimes and Gary M. Thompson, "Restaurant Revenue Management at Chevys: Determining the Best Table Mix," *Decision Sciences*, Vol. 35, No.3 (2004), pp. 371-392.

10 Sheryl E. Kimes and Gary M. Thompson, "An Evaluation of Heuristic Methods for Determining the Best Table Mix in Full-Service Restaurants," *Journal of Operations Management*, Vol. 23, No. 6 (2005), pp. 599-617.

11 Kimes, Cornell Hospitality Report; Kimes (1999), *op.cit.*; and Kimes *et al.* (1998), *op.cit*.

12 Kimes (1999), *op.cit*.

13 Kimes *et al.* (1999), p. 22.

14 Kimes, *Cornell Hotel and Restaurant Administration Quarterly*, p. 67.

Since customers use restaurant capacity during their entire meal, the ideal approach to RevPASH would be to record the apportioned revenue in each period that the meal occupies. We'll call this approach RevPASH-Ent, for RevPASH calculated using the entire meal duration. With RevPASH-Ent, the RevPASH is still zero in the first hour, but is equal to $3.33 in both the second and third hours (= 20 parties, times 4 people per party, times $10 per person, divided by 120 seats, times 30 minutes dining time in the period, divided by the 60 minutes of total dining time). Contrary to what the RevPASH-Opn suggests, the revenue captured is actually equal in the second and third hours, and both of those hours are equally effective in raising revenue.

At the same time, this example shows that RevPASH-Opn correctly expresses the RevPASH per hour for the entire day part. In this case, the calculation is $2.22 (= 20 parties, times 4 people per party, times $10 per person, divided by 120 seats, divided by 3 hours). The three hours is used in the calculation, since the day part is three hours long in this example.

As a further example of the potential problem caused by calculating RevPASH in the traditional way, let's return to our original example, but let's now assume that having noted the weak revenue in the first hour the management will offer a 25-percent discount to any parties arriving before noon. Further let's assume that this discounting policy brings in ten parties of four before noon (arriving at 11:45, say, and staying for an hour). At first appearance, this would seem to be a good idea, since (without that special discount) no revenue was being captured in the 11:00-12:00 hour (i.e., RevPASH is zero). With each person spending $7.50, the new RevPASH calculation for that hour would increase to $2.50 (from $0) in the 11:00-12:00 hour. The RevPASH would be zero for these parties in the 12:00-1:00 hour, even though they are present and occupying seats during a large section of that time. Assuming the new parties are added to the existing business, the new average RevPASH would be $3.02 (= ($2.50+$6.67+$0.00)/3) compared to the previous average of $2.22, an increase of 37 percent.

That 37-percent increase in RevPASH is not achievable, however. A problem occurs when the regular parties arrive at their usual time. In that case, the restaurant would have an insufficient number of seats available. This is because the tables occupied by the parties that arrived before noon would not be available to seat all of the parties that arrive at 12:30. If the parties arriving at 12:30 are not be willing to wait until 12:45 for their tables, the true average RevPASH is $1.94. Since 10 tables are still occupied at 12:30, only ten of the parties arriving then can be served, thus reducing the RevPASH in that hour to $3.33. Consequently, the average RevPASH of $1.94 overall (=(2.50+3.33+0)/3) represents not a 37-percent increase in RevPASH but a 13-percent decrease!

Given, then, that RevPASH-Opn is inaccurate, and that this inaccuracy can lead to ill-informed decisions, our goal in this report is to examine the degree to which it is inaccurate. Our example intentionally exaggerated the case. If we find, for example, that the inaccuracy is small, then it's probably safe to use the RevPASH-Opn approximation, but if not, we propose RevPASH-Ent. In the next section we describe how we measure the inaccuracy in RevPASH-Opn.

Determining RevPASH Accuracy

The following equation calculates the absolute value of the difference between the more precise, ideal calculation and the traditional method of calculating RevPASH, and expresses that difference as a percentage of the RevPASH in the analysis interval as calculated using the ideal approach. Obviously, since inaccuracy is being measured, numbers closer to zero are better.

Let us define INACCURACY_t to be a simple measure of the inaccuracy of RevPASH-Opn for any single analysis time interval, *t*, as follows:

$$\text{INACCURACY}_t = \frac{\text{ABS}(\text{RevPASH-Opn}_t - \text{RevPASH-Ent}_t)}{\text{RevPASH-Ent}_t} * 100\%$$

where:

RevPash-Opn_t = RevPASH in analysis time interval *t*, calculated using the traditional approach of check open time;

RevPash-Ent_t = RevPASH in analysis time interval *t*, calculated using the ideal approach of considering the entire time from check open to check close; and

ABS(x) = Absolute value of $|x|$.

While this measure can be used for any given time interval, it is more useful to average that value across all component intervals in the meal period to develop an overall measure of the inaccuracy of RevPASH-Opn, as follows:

INACCURACY = Average Across all Analysis Time Intervals (INACCURACY_t).

We will use this measure in the next section, when looking at RevPASH calculations drawn from actual restaurant data. Note that since this measurement is a percentage, a number like 130 percent would indicate that the RevPASH-Opn is off (i.e., incorrect) by 130 percent of the true RevPASH (calculated by RevPASH-Ent).

Restaurant RevPASH Results

The restaurant for which we have data has 45 tables with a total of 118 seats. For the study, we used data from the lunch day part, which covers the period of 11:30 AM to approximately 3:30 PM. We analyzed eight months of data, March through October 2007, recorded in restaurant's point-of-sale system. After extracting the data, we

Exhibit 1

Data cleaning steps

Step	Action
1	Removed any duplicate checks
2	Removed any records with $0 sales
3	Removed any records with zero (0) covers
4	Removed any records with the average check per person over $100
5	Removed any records with duration under 10 minutes or over 300 minutes
6	Removed any records with invalid table numbers

Exhibit 2

Inaccuracy of the traditional RevPASH calculation, by month and length of the analysis interval

Interval (Minutes)	March	April	May	June	July	August	September	October	Avg.	Overall
5	193.9%	226.2%	163.6%	174.9%	236.3%	216.2%	205.0%	187.0%	200.4%	195.7%
10	233.0%	267.3%	147.5%	198.2%	247.4%	256.7%	246.8%	213.8%	226.3%	193.0%
15	197.3%	170.8%	157.0%	170.3%	280.5%	220.4%	196.4%	200.6%	199.2%	165.2%
30	131.0%	117.7%	119.4%	131.6%	145.2%	126.8%	153.7%	131.9%	132.2%	124.9%
60	91.8%	90.5%	97.2%	109.0%	112.8%	88.6%	111.6%	94.6%	99.5%	92.2%
90	70.5%	67.7%	71.3%	74.1%	93.0%	66.6%	82.7%	74.6%	75.1%	73.9%
120	45.0%	42.0%	43.3%	52.0%	43.3%	37.8%	44.7%	45.9%	44.3%	44.3%
150	48.1%	46.6%	41.0%	47.4%	41.7%	38.2%	37.3%	48.5%	43.6%	43.5%
180	46.0%	45.8%	46.3%	50.6%	40.9%	44.2%	49.4%	51.6%	46.9%	46.0%
210	0.0%	44.5%	16.9%	17.0%	14.3%	16.7%	16.9%	28.8%	19.4%	40.0%
240	0.0%	0.0%	0.2%	16.7%	0.0%	0.0%	0.0%	0.0%	2.1%	14.4%
270	0.0%	0.0%	0.2%	0.0%	16.7%	0.0%	0.0%	0.0%	2.1%	16.8%
300	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%

performed a number of steps to remove records we considered to be questionable. The steps we followed are given in Exhibit 1.

After removing questionable data, we calculated that the restaurant seated an average monthly weekday party count of just over 601 (based on the following monthly counts: March, 694; April, 753; May, 651; June, 455; July, 540; August 421; September, 485; and October, 813). Exhibit 2 summarizes the inaccuracies in RevPASH-Opn, by month, on average, and for the entire eight-month data set. On average, for every individual month, and when the entire data set was analyzed, the inaccuracy in RevPASH-Opn exceeded 100 percent when the analysis time intervals were 30 minutes or shorter. Only when the analysis period was four hours (240 minutes) or longer, was the inaccuracy under 17 percent in all instances.

The overall inaccuracy values (for the entire eight-month data set analyzed jointly) are plotted in Exhibit 3 (on the next page), with the length of the analysis time interval on the x-axis. There is a strong, inverse relationship between the length of the analysis time intervals and the inaccuracy of RevPASH-Opn. Only as the length of the analysis time interval approaches the length of the day part does the inaccuracy drop to under 20 percent. Even with analysis time intervals as long as 3.5 hours (210 minutes), the inaccuracy of RevPASH-Opn exceeds 40 percent.

Exhibits 4 through 8 present the calculated RevPASH values by weekday for specific analysis time intervals for

Exhibit 3

RevPASH-Opn inaccuracy, by time interval length, for Mar-Oct 2007

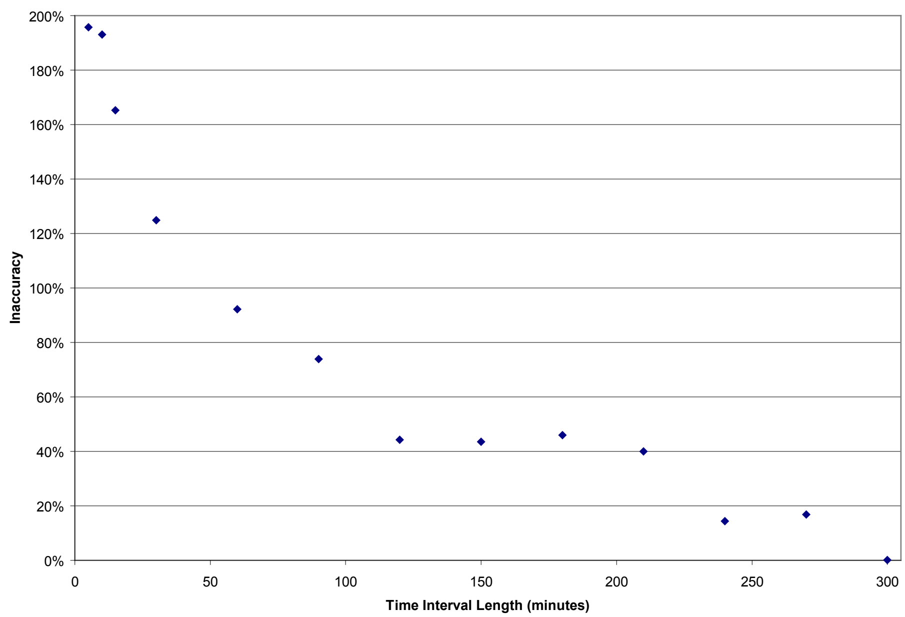
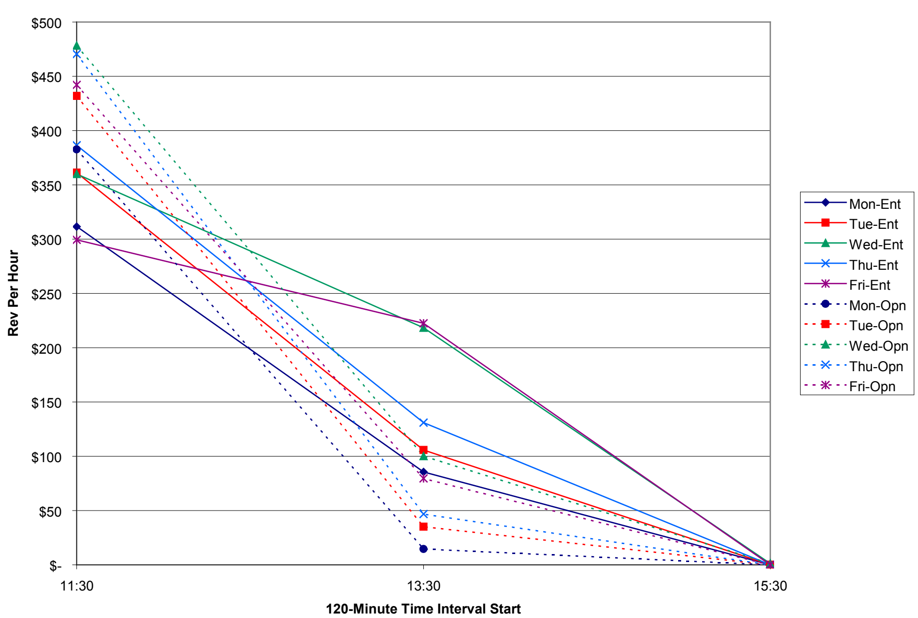


Exhibit 4

Comparison of RevPASH values for 120-minute time intervals for July 2007



Note: Day-Ent refers to a specific day, with RevPASH calculated using the ideal approach (RevPASH-Ent); while Day-Opn refers to the specific day, with RevPASH calculated using the traditional approach (RevPASH-Opn).

both RevPASH-Opn and RevPASH-Ent for selected months. In deciding which months to display, we matched the month to the level of inaccuracy at a particular analysis time interval. For example, September's inaccuracy of 205.5 percent was similar to the mean for 5-minute intervals, 200.4 percent.

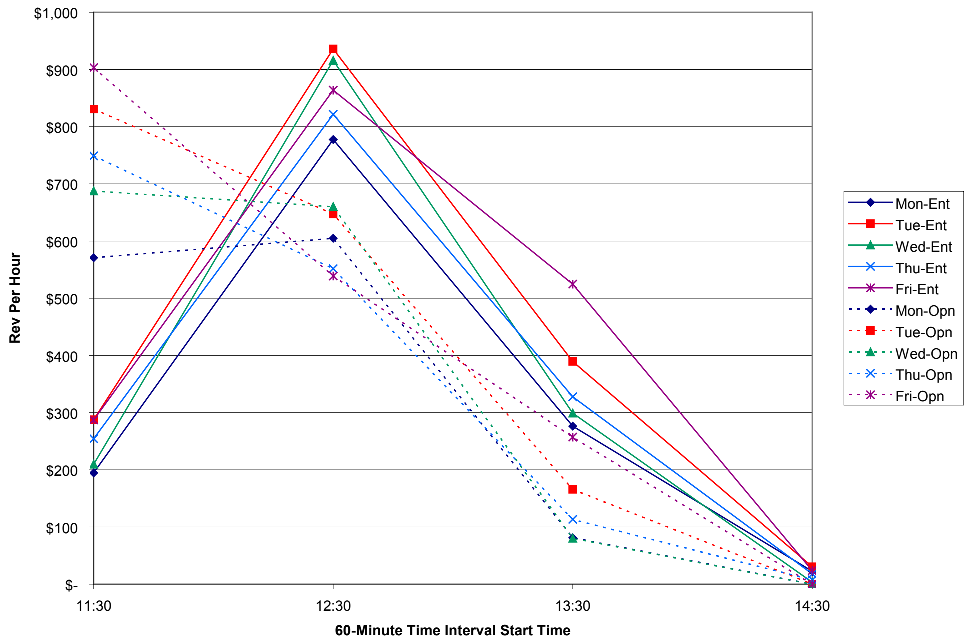
Exhibit 4 illustrates the RevPASH values for 120-minute analysis intervals in July. The RevPASH-Opn values are all higher in the first time interval (11:30-1:30) and lower in the second time interval (1:30-3:30), than the corresponding RevPASH-Ent values. Indeed, while it's true that RevPASH-Ent values drop off a modest amount from the first two hours to the second two hours, the decline in RevPASH-Opn values for those two time periods is extreme. These results are similar in many ways to those in the simple example presented earlier.

The contrast in the two RevPASH measures is even greater for 60-minute analysis intervals, which are shown for May in Exhibit 5. In the first time interval (11:30-12:30) the RevPASH-Opn values were higher than the corresponding RevPASH-Ent values, but then RevPASH-Opn was lower in all the subsequent periods (similar to the 120-minute intervals shown in Exhibit 4). By contrast, RevPASH-Ent values show that RevPASH actually builds to a peak in the second hour, and then declines much more slowly than shown by RevPASH-Opn.

Exhibit 6 shows the analysis of 30-minute intervals

Exhibit 5

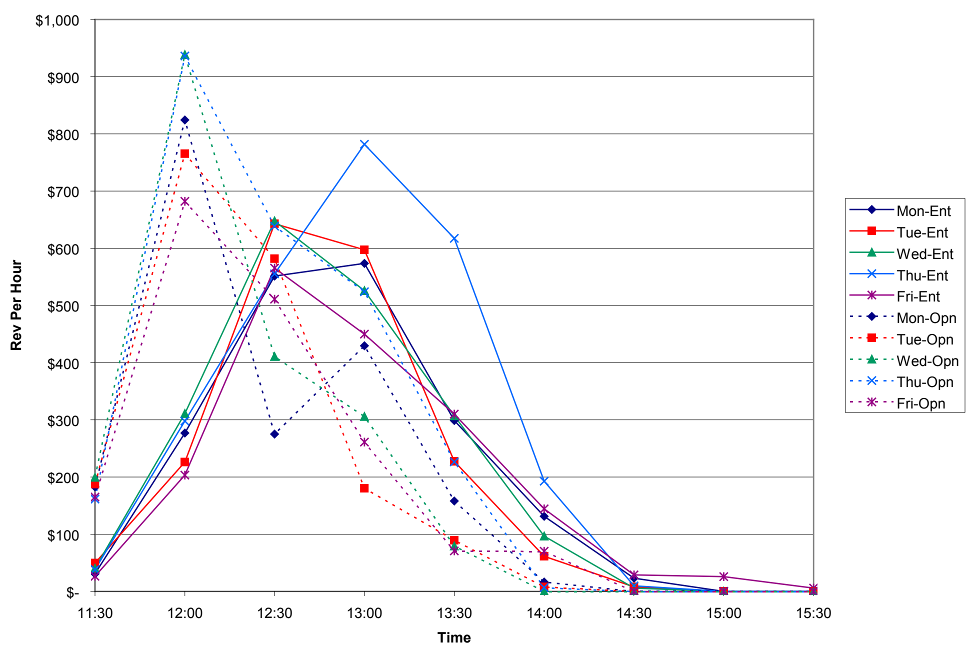
Comparison of RevPASH values for 60-minute time intervals for May 2007



Note: Day-Ent refers to a specific day, with RevPASH calculated using the ideal approach (RevPASH-Ent); while Day-Opn refers to the specific day, with RevPASH calculated using the traditional approach (RevPASH-Opn).

Exhibit 6

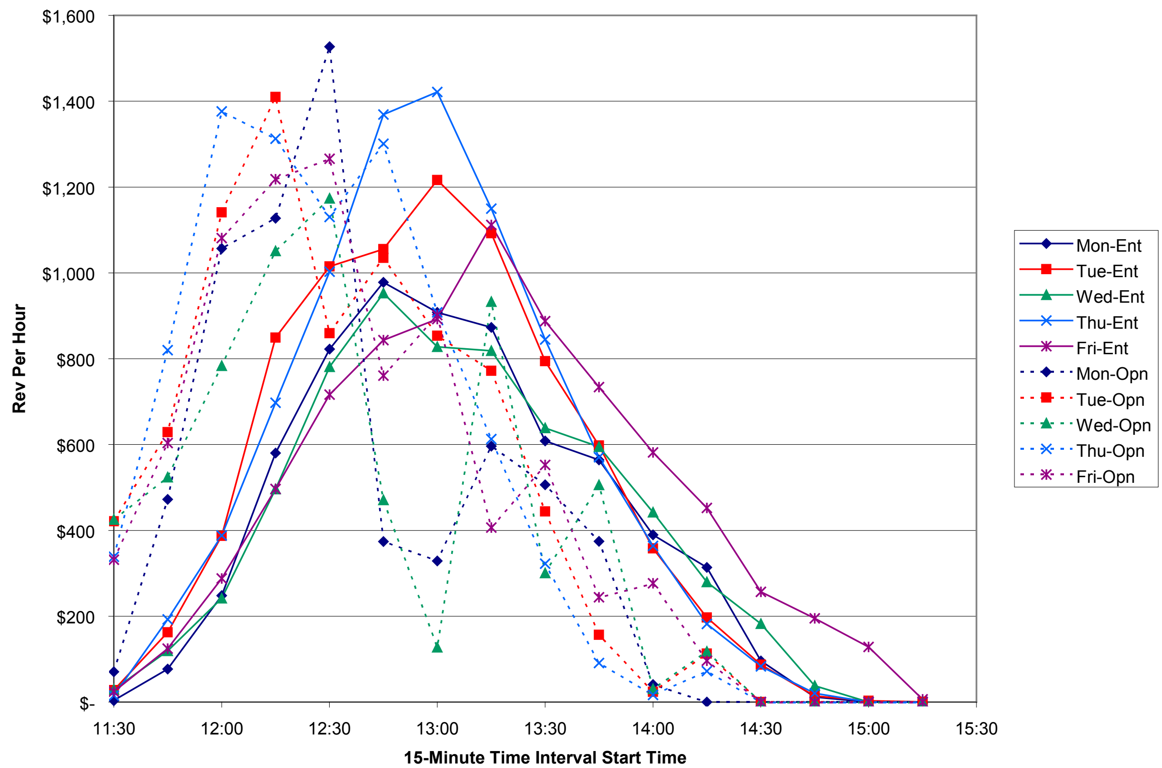
Comparison of RevPASH values for 30-minute time intervals for June 2007



Note: Day-Ent refers to a specific day, with RevPASH calculated using the ideal approach (RevPASH-Ent); while Day-Opn refers to the specific day, with RevPASH calculated using the traditional approach (RevPASH-Opn).

Exhibit 7

Comparison of RevPASH values for 15-minute time intervals for October 2007



Note: Day-Ent refers to a specific day, with RevPASH calculated using the ideal approach (RevPASH-Ent); while Day-Opn refers to the specific day, with RevPASH calculated using the traditional approach (RevPASH-Opn).

in June. As occurred in the 120- and 60-minute intervals, RevPASH-Opn values exceed the corresponding RevPASH-Ent values for the first two time intervals, but fall below the corresponding RevPASH-Ent values for periods four and higher. Again, the RevPASH pattern that emerges from RevPASH-Opn—a steep rise from the first time interval to the peak in the second time interval, followed by a consistent decline over about four periods—is quite different from the actual pattern that emerges from RevPASH-Ent. This measure shows a more gradual climb over three or four periods, a wider peak of about two periods, and then a gradual decline over several periods.

RevPASH values for 15-minute analysis intervals in October are shown in Exhibit 7. As with the results for the 30-minute analysis (Exhibit 6), the RevPASH-Opn values build more rapidly, to a higher peak, and then decline more steeply in comparison to the RevPASH-Ent values, which build gradually to a longer-lived peak and then gradually decline. The RevPASH-Opn values also have more variability not seen in the RevPASH-Ent values. Consider, for example, the results from Monday. RevPASH-Opn is higher in both the 12:30-12:45 and 1:15-1:30 time intervals than in the two intervening intervals (12:45-1:00 and 1:00-1:15).

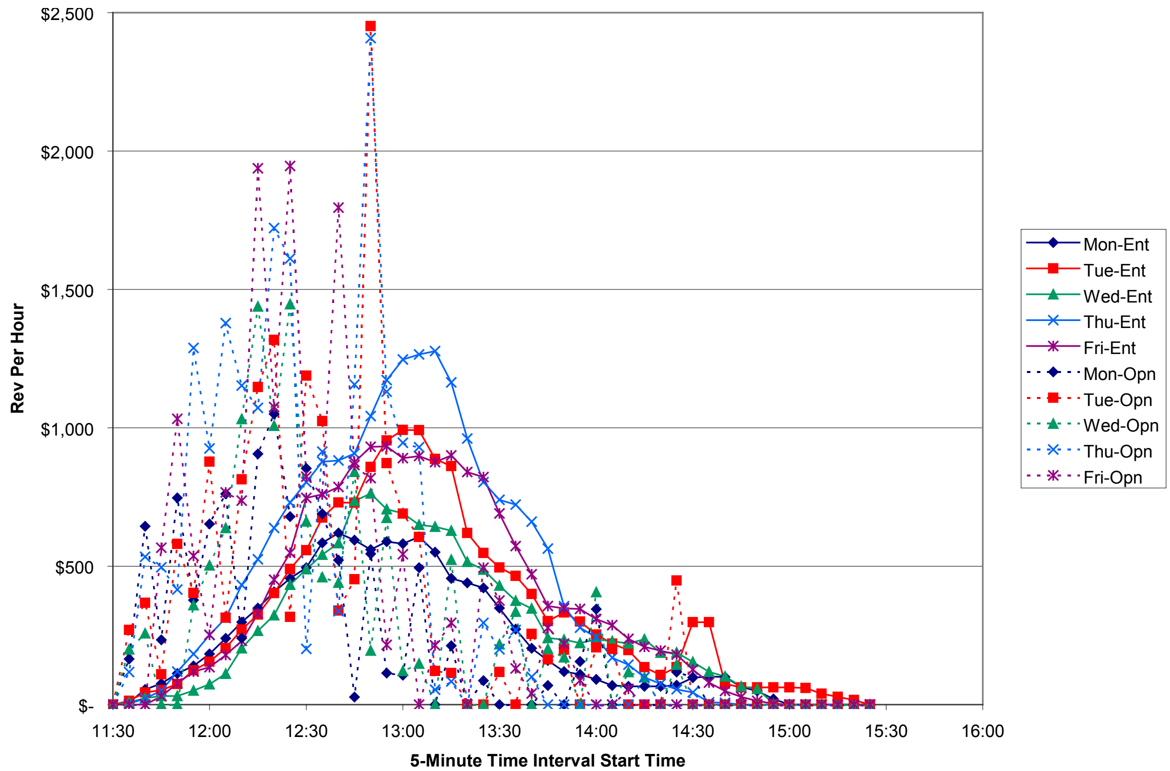
For 5-minute analysis periods in September (shown in Exhibit 8), the results bear many resemblances to those from the 15-minute analysis periods (Exhibit 7). Compared to the corresponding RevPASH-Ent values, the RevPASH-Opn values are still front-loaded and still experience higher peaks, steeper climbs and descents, and shorter-duration peaks. However, the RevPASH-Opn values have notably more period-to-period variation in the 5-minute analysis than existed with 15-minute analysis periods.

Toward A Better Measure

To summarize our findings, based on eight months of this restaurant's weekday lunch data, the traditional approach of calculating RevPASH using the check open time shows substantial inaccuracies. When RevPASH is calculated based

Exhibit 8

Comparison of RevPASH values for 5-minute time intervals for September 2007



Note: Day-Ent refers to a specific day, with RevPASH calculated using the ideal approach (RevPASH-Ent); while Day-Opn refers to the specific day, with RevPASH calculated using the traditional approach (RevPASH-Opn).

on when checks are opened, values are: more front-loaded, exhibit higher peaks, have steeper (and shorter) peaks, and more variation in the pattern. These discrepancies are the ways in which the traditional RevPASH calculation misrepresents the true RevPASH (calculated using revenue distributed over the entire period from check open to check close). The variations and inaccuracy in the traditional approach increased when we compared the two measures in ever-smaller time intervals, but even with periods of two hours or more the inaccuracy was over 40 percent. These findings raise considerable concern if RevPASH is used to guide management decisions regarding menu pricing and promotions. As we see it, when the traditional approach overestimates RevPASH values, the likely result is decisions that actually work against effective revenue management, such as hastening service to reduce duration or discontinuing discounts. Then, when the traditional approach underestimates RevPASH, managers will inappropriately be emphasizing upselling or trying to attract more customers.

The good news with respect to calculating RevPASH based on check open time is that it works correctly when the time interval being analyzed is the entire meal period. Thus, managers could continue to use that measure for broadly defined comparisons. However, our results have demonstrated the importance of calculating RevPASH using check open and close times for any length of analysis interval that is shorter than the entire meal period. Two drawbacks to calculating RevPASH using check open and close times, which are certainly not insurmountable, are **(1)** it can be harder to extract the necessary information from the POS, and **(2)** the calculations for RevPASH-Ent are more complex than those for RevPASH-Opn (as we explain in the sidebar on page 8).

As a final note, readers should remember that we have looked only at one weekday meal period during an eight-month study at a single restaurant. That said, we see no reason to believe that this restaurant is atypical and so we expect that the traditional approach to calculating RevPASH will be inaccurate in most settings. ■

Cornell Hospitality Reports
Index
www.chr.cornell.edu

Cornell Hospitality Reports Index (continued)

2006 Hospitality Tools

2006 Industry Perspectives

2005 Reports

2004 Reports