Restaurant Revenue Management:

Implementation at Chevys Arrowhead

Restaurants can apply the principles of revenue management using process analysis to exert subtle control over the duration of customers' visits. Here's an example of how that might happen.

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Revenue management can be described as selling the right inventory unit (in this case, a restaurant seat) to the right customer for the right price and at the right time. The determination of "right" in that definition—and, indeed, the essential element of revenue management—entails achieving the greatest possible revenue contribution for the company while also delivering the greatest value or utility to the customer. Companies using revenue management have reported increases in revenue ranging from 2 to 5 percent.[1]

Prevalent in airline, cruise line, hotel, and rental-car operations,[2] revenue management can also be applied to restaurants and golf courses.[3] Just as hotels offer room rates that

[1] See: B.A. Smith, J. F. Leimkuhler, and R.M. Darrow, "Yield Management at American Airlines," *Interfaces*. Vol. 22, No. 1, (1992), pp. 8–31; and R.B. Hanks, R.P. Noland and R.G. Cross, "Discounting in the Hotel Industry, A New Approach," *Cornell Hotel and Restaurant Administration Quarterly*. Vol. 33, No. 3 (June 1992), pp. 40–45.

[2] See: Smith *et al.,* pp. 8–31; Hanks *et al.,* pp. 40–45; and W.J. Carroll and R.C. Grimes, "Evolutionary Change in Product Management: Experiences in the Car-rental Industry," *Interfaces*, Vol. 25, No. 5, (1995), pp. 84–104.

[3] See: S.E. Kimes, R.B. Chase, S. Choi, E.N. Ngonzi, and P.Y. Lee, "Restaurant Revenue Management," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 40, No. 3 (June 1998), pp. 40–45; S.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; S.E. Kimes, D.I. Barrash, and J.E. Alexander, "Developing a Restaurant Revenue-management Strategy," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 34, No. 5 (October 1999), pp. 18–30; S.E. Kimes, "Revenue Management on the Links: Applying Yield Management to the Golf Industry," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 41, No. 1 (February 2000), pp. 120 –127.

change according to demand or in relation to customers' length of stay, restaurants can offer different menu prices based on customers' willingness to dine (or make reservations) during slack times. The classic, though not scientific, examples of restaurants' offering price incentives to build demand during slow periods are happy hour, early bird specials, and restricted-use coupons. As well, some restaurants take advantage of high-demand periods (e.g., Easter or Mother's Day brunch) by offering only special (premium price) meals. Those examples, however, do not constitute actual revenue management, because they are broad-brush promotions unrelated to an analysis of actual demand.

Revenue management generally involves a combination of demand-based pricing and control over the timing of customers' use of a service. Focusing on the timing aspect of revenue management, restaurants have experimented with controlling customers' dining time by increasing the efficiency of service delivery to shorten the amount of time customers spend at the table.[4] That latter aspect of revenue management—duration control—is at the heart of this article.

Given that restaurants should theoretically be able to apply revenue management, I wondered how well that might work in practice. In this article I discuss how Chevys Freshmex Restaurant developed, implemented, and evaluated a revenue-management program involving process analysis and duration control at one of its restaurants. The purpose of this article is to illustrate how to use revenue-management tools effectively and to provide managers with an easy-to-follow implementation process for their own restaurants.

I start with a brief introduction to revenue management, followed by a description of the Chevys restaurant that provided data for this study. In so doing, I analyze the restaurant's baseline performance, including seat occupancy, revenue per available seat hour (RevPASH), party-size mix, and dining duration. I also analyze and discuss the possible causes of performance. After reviewing the revenue-management strategies for duration control, I discuss how managers implemented those strategies. The article concludes with an evaluation of the Chevys revenue-management strategy and recommendations for how other restaurateurs can implement revenue management.

Revenue Management

Restaurant operators have two main strategic levers that they can use to manage revenue: price and meal duration.[5] Price is a fairly obvious target for manipulation, and many operators already offer the price-related menu promotions that I just mentioned to augment or shift peak-period demand. More-sophisticated manipulations of price include day-part pricing, day-of-week pricing, and price premiums or discounts for different party sizes, tables, and customer types.[6]

Managing meal duration can be more complicated than is adjusting prices, since most restaurants do not explicitly sell time periods. Add to that restaurateurs' concerns about rushing customers, and controlling meal duration can be a sensitive matter. However, as I explain here, duration control has great potential in a revenue-management strategy.

To control duration managers can use either internal means (i.e., those that do not involve customers) or external means (which do involve customers).[7] The chief internal duration-control methods involve regulating and redesigning service processes (including speeding up service to promote customer turnover and providing an optimal table mix), forecasting customer arrivals

[4] See: B. Sill, "Capacity Management: Making Your Service-delivery System More Productive," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 33, No. 1 (February 1991), pp. 77–87; B. Sill and R. Decker, "Applying Capacity-management Science: the Case of Browns Restaurants," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 40, No. 3 (1999), pp. 22–30; and the above-cited papers by Kimes *et al.*

[5] See: S.E. Kimes and R.B. Chase, "The Strategic Levers of Yield Management," *Journal of Service Research*, Vol. 1, No. 2 (1998), pp. 156–166; and Kimes *et al.* (1998), pp. 40–45.

[6] S.E. Kimes and J. Wirtz, "Perceived Fairness of Demand-based Pricing for Restaurants," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 43, No. 1 (February 2002), pp. 31–38.

[7] See: Kimes and Chase, pp. 156–166; and Kimes *et al.* (October 1999), pp. 18–30.

(i.e., forecasting the timing and party-size mix of arriving customers), and implementing inventory controls (usually through overbooking, if a restaurant takes reservations). External methods include booking fees or guarantees (for example, having guests guarantee reservations on a credit card) and such behavioral approaches as restricting the length of time that customers can use the table. Not surprisingly, most firms have chosen to manage duration internally, so as not to risk dissatisfied customers.

Step by step. Restaurant managers who want to implement revenue management should first establish their restaurant's baseline performance so that they have a measure of comparison for any duration-control interventions. Baseline performance includes information on average check, seat occupancy, RevPASH, meal duration, and party-size mix. Second, managers should study the causes of speedy and slow service performance so that they can develop a strategy to help employees overcome factors that slow performance. Third, managers should develop a revenue-management strategy, which can involve a mix of duration control and demand-based pricing. Fourth, they should implement the strategy and, finally, monitor its outcome.[8]

Problem Setting

Chevys Freshmex Restaurants, a U.S.-based chain of over 100 mid-scale Mexican-style restaurants, was interested in increasing its units' profitability by implementing revenue management. Chevys prides itself on its use of fresh ingredients, its lively atmosphere, and its friendly staff members. The chain has performed well, but its managers noticed that customers had to wait a long time on weekend nights in many restaurants, and guests sometimes complained about the length of time it took to get through a meal.

Chain executives chose to test revenue-management applications at the Chevys Arrowhead, located in a busy shopping mall in Glendale, Arizona, a suburb of Phoenix. The restaurant, which is open from 11:00 AM to 11:00 PM on weekdays and 11:00 AM to midnight on weekends, draws a variety of customers, including shoppers, couples, and families. This restaurant has 230 seats in the main dining room, an additional 50 seats in the bar, and patio seating that is available from March through November. Fifty-three tables in the main dining room were 4-tops, and the remaining three tables were 6-tops. As is typical in many restaurants, Chevys Arrowhead is busy for weekend dinners and lunches, when customers often wait over an hour for a table.

> Restaurant managers who want to implement revenue management should first establish their restaurant's baseline performance.

The Five-step Revenue-management Approach

The managers and I used the five-step process explained here to develop a revenue-management strategy for the restaurant. Rather than attempt price-related promotions, we focused on internal revenue management, specifically related to the duration of the dining experience. Although the data presented here are specific to Chevys Arrowhead, the process and analyses described can be applied to any restaurant.

Step 1: Establish a Baseline

The first step in the process was to establish the restaurant's baseline performance. Baseline statistics were drawn from two four-week periods of POS data and detailed time studies. Using these data, we analyzed average check per person, RevPASH, seat occupancy, meal duration (both from the POS data and from the time studies), and the party-size mix by day of week and hour of day. We excluded data recorded after 10:00 PM, because of the limited number of observations from those late hours.

The POS data showed that the average check per person for the 230-seat main dining room was $12.70 (see Exhibit 1). Calculated by day of

[8] For a thorough discussion of the five-step process, see: Kimes, pp. 16–21.

EXHIBIT 1

Average check by day of week and hour of day

	Hour of the day										
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Sunday	$12.26	$11.72	$11.73	$12.04	$10.74	$11.68	$12.24	$11.73	$11.38	$10.25	
Monday	$10.08	$10.04	$10.24	$11.59	$11.22	$11.06	$11.82	$10.70	$12.55	$10.37	$11.47
Tuesday	$10.35	$9.39	$9.61	$10.14	$9.76	$11.77	$11.46	$11.80	$12.54	$11.74	$11.42
Wednesday	$10.11	$10.01	$9.35	$9.86	$8.72	$11.32	$12.02	$12.65	$12.79	$11.32	$10.65
Thursday	$9.95	$9.03	$9.78	$10.48	$9.16	$9.75	$11.75	$13.33	$13.66	$14.47	$12.82
Friday	$9.02	$10.14	$9.86	$9.84	$8.59	$12.01	$12.85	$12.70	$13.84	$13.61	$13.03
Saturday	$11.65	$10.54	$12.40	$12.19	$10.78	$12.41	$12.42	$13.55	$14.22	$12.57	$11.16

Note: Numbers are based on eight weeks of POS data from fall 2001.

EXHIBIT 2

RevPASH by day of week and hour of day

	Hour of the day										
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Sunday	$2.19	$4.29	$5.17	$3.95	$2.50	$2.87	$3.74	$3.44	$1.87	$0.54	
Monday	$1.87	$2.42	$2.45	$1.78	$1.09	$1.03	$2.81	$3.75	$1.96	$1.00	$0.27
Tuesday	$1.11	$1.73	$1.45	$0.43	$0.28	$0.89	$1.98	$2.87	$2.19	$0.94	$0.44
Wednesday	$1.32	$2.36	$1.87	$0.64	$0.48	$1.07	$2.11	$4.12	$3.44	$1.22	$0.35
Thursday	$1.32	$2.05	$1.68	$0.69	$0.64	$1.05	$2.50	$4.67	$3.55	$1.19	$0.46
Friday	$1.00	$2.89	$2.05	$0.89	$0.94	$1.62	$5.03	$7.03	$6.50	$5.22	$1.81
Saturday	$2.63	$5.20	$5.58	$4.28	$3.11	$3.98	$4.88	$6.72	$6.25	$3.46	$0.98

Note: Numbers are based on eight weeks of POS data from fall 2001.

EXHIBIT 3

Seat occupancy of the main dining room by day of week and hour of day

	Hour of the day										
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Sunday	20%	39%	49%	36%	26%	27%	34%	32%	18%	6%	20%
Monday	20%	27%	26%	17%	11%	10%	26%	39%	17%	11%	20%
Tuesday	12%	20%	17%	5%	3%	8%	19%	27%	19%	9%	12%
Wednesday	14%	26%	22%	7%	6%	10%	19%	36%	30%	12%	14%
Thursday	15%	25%	19%	7%	8%	12%	24%	39%	29%	9%	15%
Friday	12%	31%	23%	10%	12%	15%	43%	61%	52%	42%	12%
Saturday	25%	54%	50%	39%	32%	35%	43%	55%	49%	30%	25%

Note: Numbers are based on eight weeks of POS data from fall 2001.

week and hour of day, average check ranged from $8.59 at 3:00 on Fridays to $14.47 at 8:00 on Thursdays. The highest check averages occurred on Thursday, Friday, and Saturday evenings, while the lowest checks occurred for weekday lunches.

Revenue per available seat hour provides a good estimate of seat occupancy combined with the average check.[9] That statistic is useful in two ways, the first being the important matter of how much revenue the restaurant is realizing in each time period. RevPASH was calculated by first determining the total hourly revenue from the main dining room for each day of the week and then dividing the hourly revenue by the 230 seats in the main dining room, as shown in Exhibit 2. RevPASH ranged from $0.27 on Mondays at 9:00 to $7.03 on Fridays at 6:00. The highest RevPASH was recorded on Fridays from 5:00 to 9:00, on Saturdays from noon to 2:00 and 6:00 to 8:00, and on Sundays from 1:00 to 2:00 pm. The lowest RevPASH was experienced each day after 9:00 PM, before noon, and between 2:00 and 5:00 on all weekdays.

Occupancy. The second application of RevPASH was in the derivation of seat utilization or occupancy. Since this restaurant (like most restaurants) does not track seat occupancy, we had to derive that statistic. Because RevPASH is defined as seat occupancy multiplied by average check, we could calculate seat occupancy by dividing the average check by the RevPASH and then multiplying the result by the average meal duration (in hours) for each time period, with the results shown in Exhibit 3.

The hour with the highest seat occupancy was from 6:00 to 7:00 on Fridays, and that was a mere 61 percent of available seats. Overall, the highest seat occupancies occurred in day parts with the highest RevPASH, namely Fridays from 5:00 to 9:00, Saturdays from 6:00 to 8:00, on Saturdays from noon to 2:00, and on Sundays from 1:00 to 2:00. Lowest seat occupancies (under 15 percent) occurred on weekdays before noon, between 2:00 and 5:00, and after 9:00 PM on most days.

Dining duration. Check opening and closing times allowed us to calculate the mean and standard deviation of dining duration by day of week and hour of day. We knew that duration figures thus calculated could be slightly inaccurate because the opening of the check did not necessarily correspond to when the customers were seated at the table and the closing of the check did not always reflect when the guests actually left the table. That said, the average meal duration for dinner (after 4:00) was 50 minutes, with a standard deviation of 20 minutes, while the average meal duration for lunch (before 4:00) was 44 minutes, with a standard deviation of 16 minutes. The averages and standard deviations did not vary much by day of week or by hour.

> Revenue per available seat hour (RevPASH) provides a good estimate of seat occupancy combined with the average check—and can be used to calculate revenue for specific meal times as well as how efficiently seats are used.

Time study. Since the POS data included information only on total meal duration and did not have detailed information on course timing, detailed time studies were conducted for busy weekend dinner periods. A student observer timed 100 parties over a several-week period. The following ten different categories were timed: when the party was seated, greeted by the server (and drink orders taken), drinks delivered, order taken, entrée delivered, check requested, check delivered and settled, departure, table bussed, and table reoccupied by the next party (see Exhibit 4, on the next page). The average meal time recorded in this manner (53 minutes, 15 seconds with a standard deviation of 22 minutes, 46 seconds) was a bit longer than the figure obtained from the POS data for the same time periods, showing the discrepancies introduced by using check opening and closing times as against actual seating times.

[9] For a thorough discussion of RevPASH, see: *Ibid.;* and Kimes, Barrash, and Alexander, pp. 18–30. Hourly revenue is defined as revenue from all checks that are opened during that hour.

EXHIBIT 4

Time study of dining experience (mean, standard deviation, and coefficient of variation between events)

		Mean	Standard deviation	Coefficient of variation
Pre-process	Seat to greet Greet to drinks Drinks to order	2:20 3:52 2:34	2:01 4:24 3:23	0.67
Production	Order to entrée served	11:31	5:06	0.44
In-process	Entrée served to check dropped	22:41	12:19	0.54
Post-process	Check dropped to change returned (final settlement) Change returned to departure	5:40 4:27	4:54 6:38	0.82
Between customers	Departure to bussed Bussed to reseated	2:48 0:56	2:36 1:04	0.75
Total dining duration		53:15	22:46	0.43

Note: Numbers are based on a time study conducted in fall 2001.

EXHIBIT 5

Party-size composition

	Party size			
	1–2	3–4	5–8	9+
Sunday	63.92%	27.8%	7.22%	1.03%
Monday	71.13%	22.7%	5.15%	1.03%
Tuesday	72.16%	21.6%	4.12%	1.03%
Wednesday	72.16%	22.7%	5.15%	0.00%
Thursday	72.16%	20.6%	5.15%	1.03%
Friday	68.04%	24.7%	5.15%	1.03%
Saturday	62.89%	27.8%	5.15%	1.03%

Note: Numbers are based on eight weeks of POS data from fall 2001.

Meal duration was broken into four segments, those being pre-process, production, in-process, and post-process. In addition, the between-customer processes (that is, bussing and reseating) were analyzed. Each segment had one or more subsegments (for example, the pre-process step included seating, greeting, drink delivery, and order taking).

We calculated the average duration and standard deviation of each segment (along with the coefficient of variation, defined as the standard deviation divided by the average, see Exhibit 4). Segments and subsegments with high average times represent areas in which time savings (and possibly revenue gains) can be achieved, and the same is true of segments and subsegments with high standard deviations and coefficients of variation, where variation can be reduced. Generally speaking, areas with a coefficient of variation over 0.5 should be targeted for potential improvement.

While the in-process segment (meal consumption) was the longest (at nearly 23 minutes), it had a marginally weak coefficient of variation of 0.54. In contrast, the pre-process segment took just nine minutes but had a coefficient of variation of around 0.67. Running a mean of 11.5 minutes, the production segment had a modest coefficient of variation of less than 0.5. The post-process segment took around ten minutes, with a coefficient of variation of 0.82. Finally, the between-customer processes took about four minutes but had a large coefficient of variation, nearly 0.75.

Party composition. The majority of parties (about 70 percent) were just one or two people (shown in Exhibit 5). About 25 percent of parties comprised three or four guests; just over 5 percent of parties included five to eight guests; and barely 1 percent of parties had nine or more guests.

By analyzing the baseline data, we found that Chevys Arrowhead exceeded 50-percent seat occupancy for a mere five hours per week. This statistic surprised everyone, since we all were well aware of customers' waiting lines on weekends. More critically, even though the typical party size was small, no tables were 2-tops—almost guaranteeing empty seats even while customers waited. Looking at the average dining time of

EXHIBIT 6

Possible causes of poor performance

	Equipment	Methods	Personnel	Customers	Materials
Low seat occupancy	Table mix	Bussing Hosting Communication	Training Number Commitment Compensation Management	Hard to find Reneging	Wait list
Meal duration and variation	POS terminals Credit-card authorization Service stations Restaurant layout	Hosting Seating Greeting F&B delivery Cooking Check processing Pre-bussing	Training Number Commitment Compensation Management	Choose to linger Unsure of how to behave Party size	Trays
Payment and departure	Credit-card authorization POS terminals	Check drop Check pick-up Check processing Folder drop Folder pick-up	Training Number Commitment Compensation Management	Choose to linger Unsure of how to behave Uncomfortable	Check folders
Bussing	Stacking space Service stations	Pre-bussing Communication Hosting	Training Number Commitment Compensation Management		Bucket, trays Cleaning supplies New place settings

53 minutes and its standard deviation of nearly 23 minutes, one sees that the greatest source of that variation occurred during the end of the meal and while the table was being reset between parties. After developing the baseline, we wanted to determine the possible causes of the performance that we observed.

Step 2: Understanding the Causes

The baseline analysis led to the following questions. (**1**) Why was seat occupancy so low even though customers were waiting for tables? (**2**) Why was dinner taking so long, and why was there so much variation? (**3**) Why were certain parts of the meal experience (mostly at the beginning and end of the meal) taking so long? Using fishbone analysis we divided the possible causes into five categories, as shown as a table (not a fishbone) in Exhibit 6: equipment, methods, personnel, customers and materials, and management and staff.[10]

Low seat occupancy. It wasn't hard to see that the major factor limiting seat occupancy was the inappropriate table mix. Even though the majority of parties comprised one or two people, all the tables were intended for parties larger than that. This meant that even when all tables were occupied, the restaurant would have many empty seats. It was no wonder that the seat occupancy rarely exceeded 50 percent, even when customers were waiting for a table.

[10] Fishbone analysis is a quality-management technique that can be used to help determine the possible causes of a problem. For a discussion of fishbone analysis, see: D.D. Wyckoff, "New Tools for Achieving Service Quality," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 42, No. 4 (August 2001), pp. 25–38.

Several other factors may have also contributed to the low seat occupancy. The bussing process took nearly three minutes. Thus, a reduction in the bussing time (discussed below) could improve seat occupancy. The reseating process was relatively efficient, and so a time reduction there would have little effect on occupancy.

In this example, even if Chevys could achieve only half of the revenue improvement, the restaurant would nevertheless see better than a 5-percent increase in annual revenue.

Meal duration and variability. While meal consumption (the in-process stage) took the longest time of any step, we focused instead on the segments with the highest coefficients of variation. Although we could possibly have worked to reduce the time required for meal consumption, its coefficient of variation was not alarming. Moreover, the managers and I did not want guests to feel rushed while eating.

Of the many possible factors shown in Exhibit 6 (on the previous page), we decided that the primary cause of the long and variable meal duration was related to personnel. Although Chevys has corporate time standards for each step in the dining experience, the restaurant's managers were not enforcing those standards. Even though employee turnover was low, job commitment varied, and compensation (especially for non-tipped positions) was sometimes an issue. We reasoned that if training and managerial oversight were improved, the variation in meal duration would decrease. To achieve a reduction in overall duration, though, it was necessary to study some of the end-of-meal processes in detail.

Payment and departure. Several factors slowed payment and departure. Servers were sometimes inattentive and slow in processing and delivering the check, and in picking up the completed check folder. That last factor was a sticking point because of the restaurant's location in a mall, with its high foot traffic. A noticeable number of guests stayed until the server removed the signed credit-card slip. We surmised that those diners felt uncomfortable leaving their completed check folder on a vacated table. Although another problem with credit-card authorization was that the actual machine transaction was sluggish, the primary cause of delay in this subsegment seemed to be related to personnel. We decided to focus on raising employees' awareness of the importance of efficient check processing, improving training on how to process a check, and emphasizing the need to pick up the completed check folder in a timely fashion. In addition, the Chevys chief information officer investigated possible technological improvement to the authorization equipment.

Bussing. We determined that the primary reason that the mean bussing time was relatively long was the lack of pre-bussing (another personnel-related cause). We decided to emphasize to both servers and bussers the need to clear dirty dishes from tables throughout the meal. That would leave less work when it came time to clear the table. In addition, there was inadequate space in the kitchen to stack used dishes, so we recommended that a dedicated dish scraper and stacker be on duty during busy periods.

Step 3: Developing a Revenue-management Strategy

We first identified the busy (hot) and slow (cold) periods by day of week and hour of day. Hot periods were defined as times when guests were waiting to be seated, and the remaining periods were cold. The restaurant had 10 hot hours per week, which became the focus of the revenue-management program.[11]

The two major goals were to reduce dining duration by five minutes and to increase seat occupancy by 10 percent during the hot periods. An ancillary goal was to reduce the standard deviation of total dining time by 30 percent. We expected these changes to increase revenue by at least 5 percent during the 10 hot hours, as I explain in a moment.

The goal of increased seat occupancy could be achieved by attracting more customers, pro-

[11] Those times were Friday, 5:00 to 9:00; Saturday, 12:00 to 2:00 and 5:00 to 8:00; and Sunday, 1:00 to 2:00.

viding a better table mix so more customers could be accommodated, and reducing the dining duration so more customers could be served. The restaurant already had excess demand on weekend nights (as indicated by the waiting lines). More worrisome, however, the restaurant operates in a competitive location where customers put their names on the wait list at several restaurants and patronize the first one that can make a table available. Because the restaurant's current table mix and dining duration would not allow the restaurant to serve additional customers, the managers' focus was on improving the table mix and reducing dining duration.

The 5-percent solution. To assess the revenue effects of increased occupancy and decreased dining duration, we first calculated the annual revenue for the hot periods. To review, during the ten hot hours each week, the main dining room had an average seat occupancy of 50 percent, an average check of $12.73, and an average dining time of 53 minutes.

Annual sales for the restaurant in 2001 totaled $2,358,874. The restaurant took in $861,797 per year (or about one-third of its annual revenue) during its ten hot hours. If "hot" seat occupancy increased from 50 percent to 60 percent, even if dining duration remained the same, annual revenue would potentially increase by $172,359, or 7.3 percent, as shown in the calculation in Exhibit 7. Beyond that, if dining duration could be decreased from 53 minutes to 48 minutes, even if seat occupancy remained the same, the annual revenue potential would increase by $89,771, or 3.8 percent. If both factors could be changed (that is, seat occupancy increased and dining duration decreased at the same time), the annual revenue potential would increase by $280,084, or 11.9 percent. Even if only half of the revenue potential could be achieved, the restaurant could nevertheless achieve better than a 5-percent increase in annual revenue.

Step 4: Implementation

Once the strategy was developed, the hard work of implementation began. In keeping with the strategy, implementation focused on improved table mix and on improving the efficiency of service delivery.

EXHIBIT 7

Annual incremental revenue potential

Dining duration (minutes)	Seat occupancy					
	50%	52%	54%	56%	58%	60%
53	$0	$34,472	$68,944	$103,416	$137,888	$172,359
52	$16,573	$51,708	$86,843	$121,977	$157,112	$192,247
51	$33,796	$69,620	$105,443	$141,267	$177,091	$212,915
50	$51,708	$88,248	$124,788	$161,328	$197,869	$234,409
49	$70,351	$107,637	$144,923	$182,209	$219,494	$256,780
48	$89,771	$127,833	$165,896	$203,959	$242,021	$280,084
47	$110,017	$148,889	$187,762	$226,634	$265,507	$304,379

Table mix. An optimal table mix, one that matches party-size mix as closely as possible, would allow this restaurant to serve an increased number of customers with no increase in the number of seats—thereby boosting seat occupancy during busy periods. We used the table-mix simulator developed by Gary Thompson, of Cornell University, to develop the optimal table mix for the restaurant, and also to generate a set of "near optimal" mixes (near optimal was defined as within 1.5 percent of optimal).[12]

The optimal table mix maintained the same number of seats but changed the table mix from fifty-three 4-tops and three 6-tops to forty deuces, twenty-four 4-tops, five 6-tops, and three 8-tops. Chevys hired a restaurant designer whose task was to achieve or approach the optimal table mix—provided that the restaurant ended up with the same number of seats as before and the

[12] See: G.M. Thompson, "Optimizing Restaurant-table Configurations: Specifying Combinable Tables," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 44, No. 1 (February 2003), pp. 53–60; G.M. Thompson, "Optimizing a Restaurant's Seating Capacity: Use Dedicated or Combinable Tables?," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 43, No. 3 (June 2002), pp. 48–57; S.E. Kimes and G.M. Thompson, "Restaurant Revenue Management at Chevys: Determining the Best Table Mix," Cornell University School of Hotel Administration working paper #07-05-02 (2002); and S.E. Kimes and G.M. Thompson, "A Comparison of Techniques for Identifying Optimal and Near-Optimal Restaurant Table Mixes," Cornell University School of Hotel Administration working paper #09-04-02 (2002).

EXHIBIT 8

Post-test seat occupancy by day of week and hour of day

	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00
Sunday	25%	43%	51%	32%	23%	30%	26%	36%	18%	4%	2%
Monday	13%	27%	14%	8%	8%	12%	42%	40%	36%	13%	4%
Tuesday	12%	23%	14%	5%	8%	13%	25%	42%	30%	4%	3%
Wednesday	18%	24%	18%	7%	8%	14%	28%	39%	31%	9%	4%
Thursday	15%	25%	15%	11%	8%	19%	22%	35%	34%	9%	14%
Friday	21%	31%	25%	11%	10%	21%	49%	82%	69%	43%	9%
Saturday	26%	46%	46%	30%	25%	31%	57%	71%	61%	25%	2%

Note: Numbers are based on eight weeks of POS data from spring 2001.

design was attractive and functional. Because the restaurant had been open for almost 10 years without being remodeled, the corporate managers decided to not only reconfigure the tables, but also to repaint the restaurant, relocate the host and service stations, and to provide several other aesthetic improvements.

The restaurant's managers wanted an attractive design that allowed ample space for movement but did not make customers feel crowded. Despite the restaurant's footprint and structural limitations (support pillars could not be moved and the host stand had to stay near electrical connections), the designer fulfilled her mandate of creating a plan that retained the original number of seats and creating the optimal table mix. To achieve those goals, she used a variety of design approaches, such as half-walls, banquettes, high-top tables, and well-located booths.

The management team, the corporate team, and the designer then reevaluated the initial design plans and modified that design to accommodate both the building's site-specific issues and certain customer characteristics (e.g., families with babies needed ample space for their strollers and carriages). With those additional considerations, the managers decided to adopt one of the near-optimal table mixes (i.e., thirty-nine 2-tops, thirty-five 4-tops, and two 6-tops). The simulation results showed that this table mix would provide results within 1.3 percent of the optimal mix's expected revenue.[13]

[13] Kimes and Thompson, #07-05-02.

The restaurant continued to operate during the reconstruction, with the bulk of work occurring during the hours when the restaurant was closed. To facilitate that strategy, half-walls and banquettes were fabricated off site so that they could be quickly installed.

The restaurant's reconfiguration opened other issues, notably in the back of the house. Expanding from 56 tables to 76 tables would increase the load on the kitchen (chiefly because seat occupancy would be improved), increase the labor requirements (e.g., cooks and servers), and (less critically) require the purchase of additional table supplies.

Although reducing customers' wait time was a desirable goal, the kitchen might suffer from the reduction in the buffer time that came during table bussing and reseating. Moreover, increased seat occupancy would require the preparation of more meals. To ease the kitchen's workload, the restaurant's managers decided to add an expeditor who worked the middle line during hot periods (four shifts per week). This person facilitated communication between the broiler line and the enchilada line and helped speed delivery. Two people were trained for this position at an hourly rate of $9 for four shifts of three hours each (a weekly cost of $108).

The additional 20 tables and new corporate rules on station size required an additional five servers during busy periods (again, four shifts of three hours each). The new rules reconfigured server stations to comprise four or five tables. The cost of the additional servers was $127.80 per week ($2.13 per hour for the four three-hour shifts).

The additional tables also required additional tablecloths, plates, glasses, chip baskets, salsa dishes, Texas holders, and cutlery. The entire cost of the extra supplies (not including tablecloths) was $1,395.

Improving Service

As I indicated above, strategies for improving service focused on the end of the meal—specifically, the payment and bussing processes. Changes involved improved training, more-diligent management, and additional staff.

Tightening the meal time. The time between the entrée delivery and the check delivery averaged about 23 minutes in the baseline study. The team did not wish to rush guests' meals, but managers believed that better pre-bussing would cause some guests to leave a bit more quickly and would almost certainly reduce the time needed for final bussing. For this reason, both servers and bussers were trained to do a better job of pre-bussing. In addition, the restaurant's managers augmented the back of the house during the hot times by hiring a stacker, who was responsible for scraping all dishes and stacking them for the dishwashers. The pay was $5.15 per hour for the four hot shifts of three hours each (weekly cost of $61.80).

Settlement. The baseline study found that it took an average of nearly six minutes from the time the guest requested the check to the time the check was settled and change (or a receipt) was returned. Rather than wait for the guest to ask for the check, servers were trained either to drop the check on clearing the entrée dishes or, if that was inopportune, to be alert for signs that the guests would like to leave. In addition, the corporate office kept its commitment to study IT solutions to the problem of slow credit-card authorization.

Departure. Guests in the baseline study lingered an average of another four and one-half minutes from the time the change or credit-card slip was returned until their actual departure. As I mentioned, the managers determined that guests were (understandably) loath to leave active, signed credit-card slips on the table. To remedy that situation (and to signal to guests that the transaction was, indeed, complete), servers were trained to pick up completed check folders as soon as customers were done with them. In addition to the prompt conclusion of the financial transaction, the team hoped that enhanced pre-bussing would signal the customer that it was time to leave.

Final bussing. Clearing and reseating the table took an average of nearly three minutes in the baseline study. As mentioned above, the major contributor to this lengthy process was the lack of pre-bussing by servers and the small space available in the kitchen. Our team anticipated that improved pre-bussing and the addition of the stacker position would help reduce this time.

Construction and training were completed by mid-March 2002. As expected, the first few weeks of revamped operation were hectic as management and staff members adjusted to the new layout and increased customer volume. When I returned in May 2002 to evaluate the reconfigured restaurant, it seemed that the restaurant's revenue performance had improved over the baseline. To confirm that notion, I reexamined the subsegments of the service process and recalculated revenues.

Step 5: Evaluation

Updated POS and new time-study data were collected so that seat occupancy, RevPASH, and meal duration could be recalculated. A financial analysis was performed to assess the effects of the changes three months after implementation.

Seat occupancy during the hot periods increased from 50 percent (with a peak of 61 percent) in the baseline study to a mean of 59 percent, with a peak of 82 percent (as shown in Exhibit 8). RevPASH numbers showed a similar increase. Average RevPASH for the hot periods increased from $5.85 to $6.32.

Additional time studies conducted during peak dinner times (82 observations) showed that the service-delivery improvements had largely achieved their intended goal, particularly at the end of the meal. The mean total meal time dropped from 53 minutes, 15 seconds to 50 minutes, 56 seconds, and the standard deviation of total meal duration dropped from 22 minutes,

EXHIBIT 9

Pre-test and post-test time study results

	Pre-test		Post-test*	
Seat to greet	2:20	(2:01)	**1:38**	**(1:30)**
Greet to drinks	3:52	(4:24)	4:39	(5:49)
Drinks to order	2:34	(3:23)	3:14	(4:18)
Order to entrée	11:31	(5:06)	**11:28**	**(4:06)**
Entrée to check dropped	22:41	(12:19)	**21:47**	**(6:44)**
Check dropped to change returned	5:40	(4:54)	**2:55**	**(1:56)**
Change returned to departure	4:27	(6:38)	**4:09**	**(5:09)**
Departure to bussed	2:48	(2:36)	**2:00**	**(1:54)**
Bussed to reseated	0:56	(1:04)	**1:06**	**(1:02)**
Total dining duration	53:15	(22:46)	**50:56**	**(15:09)**

* Times in bold were shorter during the post-test than they were in the pretest.
Means are given first, followed by standard deviations in parenthesis.

46 seconds to 15 minutes, 9 seconds. The specific goal of a five-minute drop in dining duration was not achieved, but the variation was decreased substantially (see Exhibit 9).

The mean duration of the steps on which managers had focused all responded to the interventions, as follows:

(1) *Seat to greet*. The restaurant reduced this time by 42 seconds and trimmed the standard deviation by 25 percent. This could be attributed to training and improved awareness.

(2) *Entrée served to check drop*. The total time diminished by about a minute, but the standard deviation went down by over 40 percent. This can be attributed to the improved pre-bussing.

(3) *Check drop to final settlement (change or receipt returned)*. The restaurant was able to reduce this time by nearly one-half and was able to reduce the standard deviation by over 60 percent. This can be attributed to training and the enhanced awareness of the servers of the importance of this process.

(4) *Final settlement to departure*. The restaurant did not have complete control of this time, since customers can choose when they want to leave. The time decreased slightly, as did the standard deviation, which may indicate that the emphasis on picking up the check folder had worked.

(5) *Order to entrée delivery*. The goal here was mostly to avoid deterioration in the face of greater seat occupancy. Indeed, the time for this step did not decrease substantially, but the impressive fact was that the kitchen was able to maintain its pace for preparing and delivering entrées even with the increased number of customers from the new table mix. The restaurant's managers attributed this to the strong kitchen staff members who were willing to experiment with various approaches to handling the increased demand.

Again, the focus of managers' interventions was improving the end of the meal, and it showed. In fact, the duration of two subsegments at the beginning of the meal (greet to drinks, drinks to order) increased, thus representing areas for future improvement. Also, the restaurant had been doing an excellent job of reseating tables once they were cleared. This time increased by 10 seconds after the renovations and interventions were instituted.

Financial Analysis

While the drop in service times was heartening, Chevys managers wanted to ascertain whether the restaurant had actually met its key goal of a 5-percent increase in revenue. Since RevPASH had increased, store revenue had increased, but it was unclear whether that increase resulted from the managers' interventions or from other market conditions. To control for outside factors, the financial performance for the Arrowhead restaurant and two other Chevys restaurants in the Phoenix market was analyzed.

To begin with, the effects of the national recession seemed to show up in the restaurants' finances. During the seven weeks before revenue-management implementation, the Arrowhead store had experienced a 5.7-percent drop in year-to-year revenue (that is, from the similar period 2001 to the seven weeks before construction began in 2002), while the comparable restaurants had seen combined revenues fall by 10.6 percent.

A similar seven-week analysis was conducted after the new table mix and other measures were implemented. The Arrowhead store had experienced a 2.0-percent increase in revenue from 2001 to 2002, while the 2002 sales for the control stores were 8.0-percent less than the same period sales in 2001. The Arrowhead store had realized a 7.7-percentage-point increase in revenue from pre-test to post-test, while the control stores had increased sales by 2.6 percentage points. The 5.1-percentage-point difference was attributed to management interventions.

At what cost? The new table mix and service changes were not without cost. In round figures, the remodeling cost $49,000, additional small wares cost approximately $1,400, and labor costs increased by about $15,000 per year.[14]

The Phoenix Arrowhead restaurant had approximately $2.4 million in sales in 2001. Based on the projected increase of 5.1 percentage points calculated above, there was an estimated annual sales increase of approximately $120,000 over the amount that general market conditions might have afforded had the restaurant's management done nothing. Given Chevys 45.5-percent EBITDA flow through, approximately $54,600 of this amount would go to the bottom line. The total capital cost of the project was around $50,400, so the cash-on-cash return was about 108 percent, with a payback of less than one year (11.1 months). The remodeling expenses were a one-time expense, so the return will be even greater in the future.

Making the Chevys Arrowhead Experience Work for You

By analyzing its service process and table mix, Chevys Arrowhead was able to increase revenue by approximately 5 percentage points more than the two other Chevys that we examined. This performance boost came from its improved table mix, changes in the service delivery, and improved training. Seat occupancy and RevPASH increased, dining duration and variation in that duration decreased, and revenue and profitability increased.

If you want to improve your restaurant's revenue in this way, you should first establish your restaurant's baseline performance. Collect at least a month of detailed POS data and analyze your seat occupancy, average check, RevPASH, party mix, and dining duration by day of week and hour of day. In addition, hire someone (this is an ideal part-time job for a student) to conduct time studies of your restaurant during your busy periods.

After you have developed the baseline performance, sit down with your management team and staff members to make sense of what you have discovered. Discuss what might be driving your performance and pinpoint specific areas in need of improvement.

When developing a strategy, focus on your busy periods, establish specific performance goals, and determine feasible ways of meeting these goals. In addition, be sure to assess the financial effects of any given strategy. Implementation of the strategies is probably the most difficult, but most important part of the process. Implementation required a strong management team, good training, and a willingness to try new things (such as changing the table mix or hiring more employees).

Finally, when you have made all of the changes, reevaluate your performance after about two months. Gather additional POS data and conduct additional time studies to see whether your efforts have paid off.

For more information on developing a revenue-management program, you can read the articles mentioned in this paper, you can take the courses in restaurant revenue management available on-line from e-cornell (www.ecornell.com), or enroll in a restaurant-revenue-management course offered through the Cornell hotel school's Professional Development Program (PDP).

Other restaurants could realize similar results by carefully analyzing their current performance, determining the causes of that performance, and developing appropriate strategies to improve performance. Changes in table mix and problematic service delivery hold particular promise, but only when such changes are combined with implementation that emphasizes training, employee buy-in, and enhanced management. ■

[14] Ongoing costs included $61.80 per week for an additional busser ($5.15 per hour for four shifts of three hours each), $108.00 per week for a kitchen stacker ($9.00 per hour during the same four three-hour shifts), and $127.80 per week for five additional servers (at $2.13 per hour for the four shifts). The total additional labor cost was $297.60 per week.

Sheryl, do you have a hard copy of a good portrait photo that we may borrow? We're not having very good luck with our scans or with downloading photos from the SHA faculty directory.—Fred

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