



Benihana: A New Look at an Old Classic

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Abstract. This short case heavily references the “old classic” HBS case on Benihana, and is intended to be used in conjunction with a simulation that helps students gain insight into how Benihana achieved its profitability. The simulation helps bring out many key operational issues, such as how variability in demand and in processing can negatively impact profitability. The case analysis goes on to show how Benihana reduces variability, and illustrates concepts such as the product-process spectrum, the impact of a bottleneck, and the advantage of simultaneous product and process engineering.

Keywords: process analysis, simulation, variability, queuing.

1. Introductory Note

Benihana might be thought of as an “old classic” in Operations Management. The original Harvard Business School (HBS) version was published in 1972, but the Harvard case continues to be a best seller. This short case heavily references the HBS case, number 9-673-057 (rev. Dec. 14, 1998), however what has been added to enhance the case experience is a simulation that can be used to gain insight into how the operation achieves its profitability, as compared to other restaurants.

There is a set of web sites associated with this case note, intended for both students and instructors, at http://www.msb.edu/faculty/schmidtg/Benihana_Project/. Students are directed to this web site in the case itself, in order to help them navigate the process of analyzing the case. It provides not only a link to download an animated simulation, but also provides a link to download (free of charge) a demonstration copy of the Extend software upon which the simulation is based. (If you wish to go directly to the software download (version 5 is recommended), it is at http://www.imaginethtatinc.com/prods_player.html). The web site developed by the authors of this case makes the entire process quite user-friendly – undergraduate business students and MBAs typically tackle the assignment without any need to demonstrate the software or the simulation itself in class. (Internet Explorer is recommended for the downloads.)

There is also an instructor-page at the web site. Here, instructors can register to gain access to an accompanying set of PowerPoint slides, along with the teaching note.

This simulation-based case can be used as the lead-in case in a core class in Operations Management, to offer early exposure to many Operations principles and whet the students' appetites. The case is rich enough and the material captivating enough to extend the discussion to two class sessions. It has been used successfully at many levels, including undergraduate, MBA, and executive education. Students can readily identify with the case, because most have been in a teppanyaki-style restaurant.

In our experience, the simulation makes a significant supplemental contribution to the way this case can be taught, and to the way it can be used to highlight many key Operations lessons. In particular, the simulation is a tool that helps students unlock the secrets of Benihana's profitability, and helps them digest key Operational insights. In fact, given the many key issues that are brought out, we tell our students that if they have really internalized all the take-aways the simulation study has to offer, they have already pretty much mastered the course. Then throughout the course we often relate the "lesson of the day" to what we saw in the Benihana simulation.

The objective of the teaching plan presented in the teaching note (available to instructors after registration at the web site) is to help students systematically unearth the elements of BH's profitability, determining how each aspect of the operation contributes to superior performance. The roadmap for discussion is to first determine how profitable Benihana is, compared to a typical restaurant. We then determine what limits the profitability of a typical restaurant, and figure out how Benihana has been able to relax those constraints.

Effectively, Benihana competes with other restaurants who offer a fine dining experience. In terms of the product/process spectrum, these competitive restaurants are job shops offering customized goods. Benihana, however, "gets away with" offering a very standard product and processes and therefore can operate almost like a flow shop, with high efficiency and low cost. A key to Benihana's success was its ability to create a standard product that customers would be happy with, in spite of the fact that if customers go to a competitor they get a customized product (they get to sit at a table with only their own party, they get to select from a larger menu, they may request that the food be specially prepared, they can make special requests from the waiter, and so forth).

In the process of figuring out the elements of Benihana's success, students learn how to apply the principles of operations management, and become familiar with the vernacular of this management discipline. Students come to realize that terms such as throughput capacity, demand variability, capacity utilization, and service time apply not only to manufacturing, but also to service operations. They also learn how *variability* negatively impacts an operation. But possibly the most important message it conveys is simply that

Operations Management can have a big impact on a firm's profitability, including a firm that competes in the service sector of the economy.

At the time of the case, Benihana's success was predicated on a demand stream that exceeded capacity (at least during the prime dining hours). A review of the last five financial reports (1999-2003) suggests Benihana currently has a return on sales (net income over revenues) of 5.0%-6.4%, still above a typical restaurant but well below the estimated return early in its life. Further, these financial reports suggest its food/beverage cost is still running at about 25% of sales, below the typical figure. These numbers might suggest that the benefits of a limited menu continue to accrue to Benihana, but that possibly some of the other early benefits such as a favorable level of demand relative to throughput capacity have been diluted due to competitive pressures, for example.

2. Case Study

The first Benihana opened in 1964 near Broadway in New York as a four-table unit ("How Benihana Started", 2004). Within less than a decade, the restaurant had turned the young founder, Hiroaki Aoki (pronounced HE-ROH-AH-Kee Ah-OH-Kee), into a very successful businessman. He adopted the more pronounceable name Rocky (more pronounceable to many Americans, anyway), and in one of the early TV ads he is seen stepping into one of his three Rolls Royces, likening himself to a Horatio Alger character (that is, to someone having gone from rags-to-riches).

The classic Benihana case by Klug and Sasser (1998) provides further details of the early Benihana experience. By 1972 there were 15 Benihanas scattered across the country grossing over \$12 million per year. There were several hallmarks of these early restaurants. One was authenticity in décor – authentic Japanese farmhouse interiors including items such as beams, artifacts, and light fixtures that were shipped to the United States. Second, food was prepared at the table by highly-trained chefs. The chefs were native Japanese (young and single) that had completed a three-year apprenticeship.

If you have ever been to a Benihana, you realize that in reality, the job title of "performer" might be a more accurate one than chef, because of the degree of showmanship the chefs exhibit in their work. The food is sliced and diced and tossed into the air as it is cooked hibachi style (teppan-yaki style) on a grill around which the customers dine, typically in groups of eight, sitting on wooden benches. The chef trims any fat off the meat and as the food is cooked, and morsels are immediately presented hot of the grill to the customers, served on a ledge on the grill. At the end of the meal, the chef bows to the group and

moves on to the next table (a chef and waitress together might handle two tables).

A third key feature of Benihana restaurants is that customers are collected together in groups for seating, such that complete strangers are often seated next to each other. The menu itself is a fourth key feature. It might consist of three basic items, chicken, shrimp, and steak (and possibly filet mignon). All meals are accompanied by a fixed set of other items including rice, mushrooms, onions, bean sprouts, and zucchini, with ice cream for dessert.

Thus while the early Benihana restaurants may have had authentic Japanese décor, we see that the food choices and style of preparation weren't so authentic. Rocky had discovered that "Americans enjoy eating in exotic surroundings but are deeply mistrustful of exotic foods" (Klug and Sasser, 1998). While some people may think of raw fish when they think of Japanese food (another of the early TV ads alludes to this perception), the Benihana style of cooking probably alleviated some of that concern. After all, what could be more American than sitting around a grill with steak or chicken sizzling in front of you?

Another early TV ad suggests Benihana wanted to position its restaurant as someplace you might go for a special occasion, such as an anniversary or to celebrate with friends. In other words, they seemed to view their competition as relatively up-scale restaurants, but as a place you go to enjoy yourself in an active, dynamic environment, rather than a quiet, docile, "stuffy" setting.

Rocky realized the bar played a significant role for the restaurant. He originally saw the restaurant as primarily food service, and accordingly an early bar had only eight seats and no lounge. However, the amount of space allocated to the bar and lounge was an issue that Rocky paid close attention to in future units (per Klug and Sasser, 1998).

Some further statistics for the early Benihana restaurants were that an average facility had 14 tables, and a customer spent about one hour at the restaurant. A dinner check was about \$10, including about \$7.30 for the meal and the balance for drinks at around \$1.50 each. The dinner period was typically somewhere around three hours long, from 6 p.m. to 9 p.m. After "catching fire", demand was heavy – for example, a restaurant might have drawn something like 120 customers per hour who arrived in parties of between two and twelve people. (These statistics have been estimated based on the various numbers given in Klug and Sasser, 1998).

Table 1 compares Benihana's early profitability with that of a typical restaurant.

Table 1: Behihana as compared to a typical restaurant of similar caliber (adapted from Klug and Sasser, 1998)

Sales and costs (percentages are relative to gross sales, unless stated otherwise)	Percentages		Dollars/yr.
	Typical restaurant	Typical Benihana restaurant	Typical Benihana restaurant
Gross sales	100%	100%	\$1,300,000
Food sales	70-80%	70%	\$910,000
Beverage sales	20-30%	30%	\$390,000
Food cost, % of food sales	38-48%	30%	\$273,000
Beverage cost, % of beverage sales	25-30%	20%	\$78,000
Gross profit	55-65%	73%	\$949,000
Labor, benefits	35-40%	10%	\$130,000
Advertising	0.75-2%	8-10%	\$130,000
Rent	4.5-9%	5-7%	\$65,000
Other (supplies, misc., utilities, admin, maint, insurance, royalties)	10-20%	10-15% (no royalties)	\$150,000
Pre-tax profit (before depreciation)	3-14%		
Depreciation*	2.5-5%		
Pre-tax profit	0.5-9%		
Tax (assume 50% tax rate)	0.25-4.5%		
After tax profit	0.25-4.5%		
Cash flow (add back the depreciation)	–	–	
One-Time Construction Cost of Facility	–	–	\$300,000
Payback (years)	–	–	

* For simplicity, assume straight-line depreciation of \$300,000 over 10 years.

References:

- “How Benihana Started”, 2004, http://www.benihana.com/benihana_history.asp
 Klug, J. and Sasser, W. E. (1998), “Benihana of Tokyo”, Harvard Business School case 9-673-057, Rev. Dec 14.

Assignment

1. *What is the payback period for a restaurant?* Finish filling out Table 1 of the case.
2. *How big a factor is the bar in Benihana's profitability, and how big a factor is batching?* Go to the web site http://www.msb.edu/faculty/schmidtg/Benihana_Project/ and follow the instructions to download and run the Benihana simulation. See the Appendix for details regarding the simulation.

Run the simulation (multiple times) under each of four scenarios: 1) As a "typical oldfashioned restaurant". That is, run it as a restaurant that doesn't have a bar (zero seats in the bar) and doesn't batch customers; 2) A restaurant that HAS a bar (55 seats) but doesn't batch customers; 3) as a restaurant that batches customers but doesn't have a bar, and 4) As Benihana runs their restaurants, namely, with a bar and with batching of customers. Using your results, calculate how much the bar adds to the restaurant's profitability, and how much batching adds. (Run all the simulations with 14 tables in the restaurant.)

3. *Is Benihana constrained by its capacity?* Compare Benihana's demand (as found in the simulation) with its capacity. Comment on Benihana's capacity as compared to a typical restaurant of a similar size and clientele.
4. *How do restaurants perform in regard to capacity utilization?* In theory, you might expect capacity utilization to be equal to the customer demand divided by the capacity, up to a limit of 100% utilization. Using your simulation results, calculate the utilization levels for the three scenarios, and explain why each one is NOT equal to demand divided by capacity.
5. *How long do customers wait in the bar? Do they mind the wait?* Assume both the bar and the restaurant are full, and assume the average dining time is one hour. The first unit built, the old Benihana West, had 5 tables. Since each table clears once per hour, 5 tables clear every hour, or one table every 12 minutes. Since each table seats 8, every 12 minutes 8 people leave the restaurant, replaced by 8 customers from the bar, in turn replaced by 8 new customers entering the bar. The bar only seats 8, so a customer enters the bar and moves to the restaurant after 12 minutes of

waiting. Now, it is your task to apply similar logic to the number of seats in the restaurant and seats in the bar as indicated in Exhibit 2 of the case.

6. *How do the bar, the chef, and the limited menu contribute to Benihana's operational, financial and marketing objectives? List the contributions of each of these three factors to the strategy and profitability of the firm.*
7. *Draw a process flow diagram. In what way does the process itself actually form part of the product?*
8. *Where does Benihana fit on the product/process spectrum? Is Benihana closer to a job shop, or a flow shop?*
9. *Is Benihana's competitive advantage sustainable? Why or why not?*
10. *Should Benihana expand? If so, how?*

Appendix: Simulation of Benihana

I. Overview

The BH simulation uses discrete event modeling techniques to simulate customer flow through BH's West 52nd Street restaurant. The simulation runs through a single evening demand cycle from 6:00 p.m. to 10:30 p.m. The restaurant opens at 6 p.m. to light demand, experiences a "rush" from 7 to 8 p.m. and continues to seat new arrivals until 9 p.m. In addition to emulating customer throughput and dinner choices, the model incorporates a sensitivity analysis feature that enables the user to examine the impact of altering the restaurant's capacity.

II. Running the Simulation

Go to the web site http://www.msb.edu/faculty/schmidtg/Benihana_Project/, and follow the instructions to download the simulation. The simulation runs on Extend™ version 5 (V5), marketed by "Imagine That" of San Jose, CA. Unless you already have the Extend software, you will also have to download a demo copy of the software (V5). There is a link at the above web page, or you can go directly to http://www.imaginethtatinc.com/prods_player.html (be sure it is Version 5, V5, that you download). The downloads have been successful using Internet Explorer (if a download fails using another browser, try Explorer).

Following the instructions to load Version 5 (V5) of the Extend software on your machine. After completing the download (including a restart of your computer), open the Extend program. Next open the Benihana.mox simulation file by pulling down the "File" menu and selecting "Open" and then locating the Benihana.mox file in the place you previously downloaded it. You will see a layout of the restaurant's floor plan in the "primary window". To run the simulation, pull-down the RUN menu to the RUN SIMULATION command. Once initiated, the simulation will generate a plotter that tracks the number of people in the bar, the number of dining tables in use, the total number of customers served and the number of customers who opted to depart when the bar was full. It is possible to run the model with animation in order to see in "slow motion" what happens (in the RUN menu select "Show Animation"). However, this slows considerably the speed of the simulation.

The plotter updates dynamically while the simulation runs with time displayed on the x-axis. You will notice that the plotter has two y-axis with different scales. The left vertical axis corresponds to the blue plot (number of people in the bar) and the red plot (number of tables in use). The right vertical

axis corresponds to the green plot (total number of people served) and the gray plot (number of customers who arrived and turned away since the bar was full). Note: If the plotted data exceeds the range of the display, the plotter can be re-sized by a single mouse click on the “auto-scale Y” command located on the menu bar along the top of the “plotter window” (vice the main menu bar).

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Additional data from the simulation can be accessed once the simulation completes a run. From the MODEL menu, pull-down to the OPEN NOTEBOOK command. This will bring up a data notebook window that contains simulation results on: utilization rates of the cocktail lounge and dining room, the numbers of each type of dinner served, number of drinks sold, as well as the average and maximum wait time for customers in the lounge. (Importantly, though, the utilization numbers may not be calculated in the fashion asked for in the assignment.)

After closing both the notebook and plotter windows, you will see the main window containing the floor plan. The Sensitivity Analysis block in the lower left corner of the window enables the user to alter the restaurant’s capacity and turn “batching” on and off. The capacity of the cocktail lounge or the dining area may be changed by simply clicking on the field and typing in the desired value. After typing in the desired capacity values the user may either run the model once as described above, or execute several runs to better assess the impact of the change.

The “batching” selector switches the model between two modes of operation. When the batching switch is “on” (the switch is set = 0) customers are “batched” from the lounge area in groups of 8, replicating BH’s standard operating policy. When the batching switch is “off” (the switch is set = 1) customers are seated in the dining area based upon the size of their party. (e.g. If a group arrives as a party of 5, they will be seated as a party of 5 and completely occupy an 8-place table).

This feature is particularly useful for demonstrating the increased throughput BH realizes by “batching”. You may compare the efficiency of each mode in handling the same customer demand profile for varying restaurant capacities. For example, with batching turned “off”, you could experiment to find out how many tables would be needed to match the throughput achieved with a standard 14-table Benihana that batches customers.

To run the simulation consecutively numerous times, pull-down the RUN menu and select SIMULATION SETUP. This brings up a window that contains an option to change NUMBER OF RUNS. Enter the desired number of runs and select RUN NOW. (Note: Extend limits the number of consecutive plots that it saves to four.) As each run is executed, the software saves the new

plot over the previous. Once all four runs are completed, the results of each may be viewed by a “single-click” on the “page-tab” at the bottom left corner of the plotter window. The notebook statistics are just for the last run, however, and NOT the average of the 4 runs.

III. Model Parameters:

A) Demand Profile:

1. Customers arrive in party sizes ranging from 2 to 12.
2. Party size is set by a probability distribution (customized to case data) with a mean of 4.
3. Party inter-arrival times are generated by an exponential probability distribution.
4. Mean inter-arrival times are: 4 min. for the 1st & 3rd hours, 1 min. for the “dinner rush”.

B) Benihana Floor Plan and Operating Procedures (unless otherwise specified):

1. The cocktail lounge has a 55-person seating capacity.
2. Customers are “batched” from the bar in groups of 8 to the dining area.
3. The dining area has a 112-person seating capacity.

C) Customer Habits and Preferences:

1. If the bar is full, arriving parties depart immediately instead of waiting to eat.
2. Customers consume one drink every twelve minutes they spend in the bar (case data).
3. The duration of meals is normally distributed with a mean of 60 min., std. dev. of 7 min.
4. The distribution of beef, chicken and shrimp choices is customized to case data.

Teaching Note

There is a set of PowerPoint slides that accompany this teaching note. It is recommended that the slides be viewed simultaneously with the reading of this note.

1. Roadmap for Discussion (Slide 1)

The roadmap for analysis of the case is as shown in PowerPoint Slide 1. First, we calculate just how profitable BH is, relative to a typical restaurant. (We find it is three times as profitable, with a BH restaurant achieving payback in 1.2 years.) We then compare BH to a typical restaurant, to determine how it achieves this superior profitability. Namely: 1) We look at what BH's performance would be if it were a typical restaurant; 2) We figure out what is limiting the performance of such a typical restaurant; and 3) We identify what BH does to remove or relax some of these limits to profitability.

2. How Successful Is BH? (Slide 2)

How did Rocky finance his Rolex, multi-million dollar home, and three Rolls-Royces? We can get an idea of just how lucrative his business was by comparing his numbers for the Chicago unit with those of a typical restaurant, as shown in Table 1. (As suggested in the sample assignment given in Appendix I, students can be asked to fill out the two right-hand columns pertaining to BH). Results suggest that in terms of pre-tax profit (before depreciation), BH's return is roughly 34%, as compared to 3-14% for the typical restaurant (i.e., BH is three times or more as profitable).

The first West Side unit reportedly paid for itself in 6 months. Given that a BH unit costs \$300,000, as suggested in the case, and generates a cash flow of about \$252,000, as shown in Table 1, the payback period for a more typical BH unit is the $\$300,000 / \$252,000 = 1.2$ years. Thus while the payback for a typical BH is not as quick it was for the West Side unit, the 1.2 year payback is still quite lucrative.

Table 1: Benihana's Profitability as Compared to a Typical Restaurant

Sales and costs (percentages are relative to gross sales, unless stated otherwise)	Percentages		Dollars/yr.
	Typical restaurant	Typical Benihana restaurant	Typical Benihana restaurant
Gross sales	100%	100%	\$1,300,000
Food sales	70-80%	70%	\$910,000
Beverage sales	20-30%	30%	\$390,000
Food cost, % of food sales	38-48%	30%	\$273,000
Beverage cost, % of beverage sales	25-30%	20%	\$78,000
Gross profit	55-65%	73%	\$949,000
Labor, benefits	35-40%	10%	\$130,000
Advertising	0.75-2%	8-10%	\$130,000
Rent	4.5-9%	5-7%	\$65,000
Other (supplies, misc., utilities, admin, maint, insurance, royalties)	10-20%	10-15% (no royalties)	\$150,000
Pre-tax profit (before depreciation)	3-14%	36%	\$474,000
Depreciation*	2.5-5%	2%	\$30,000
Pre-tax profit	0.5-9%	34%	\$444,000
Tax (assume 50% tax rate)	0.25-4.5%	17%	\$222,000
After tax profit	0.25-4.5%	17%	\$222,000
Cash flow (add back the depreciation)	–	–	\$252,000
Payback (years)	–	–	1.2 years

*For simplicity, assume straight-line depreciation of the \$300,000 over 10 years.

3. Why Is BH So Successful?

We now begin to dissect BH's operation, to determine its elements of success. The simulation provides a framework for this analysis. First we perform a capacity analysis, and examine what BH has done to increase its capacity as compared to if it were a more typical restaurant. Then we go on to compare BH to a more typical restaurant in regard to its management of demand variability and variability in service time.

3.1. Does BH Have Enough Capacity? (Slide 3)

To determine if there is a capacity problem, we compare demand against capacity. More precisely, we compare demand rate against throughput capacity. Throughput capacity is the rate at which items move through the system when it is continually busy, i.e., when it is running at full capacity. (Throughput rate is the actual rate at which items move through the system.)

3.1.1. What Is BH's Demand Rate?

As stated in Appendix II (or as can be found by running the simulation), we simulate the evening dinner period. Between 6 p.m. and 7 p.m. demand is light, with 4 minutes between arrivals (while the simulation incorporates variability, we will speak in terms of averages). This corresponds to the arrival of 15 parties, or 60 customers (4 per party). Between 7 and 8 p.m. the diners arrive faster, with 1 minute between arrivals, suggesting an arrival of 240 customers. Arrivals taper off again between 8 and 9 p.m. to 60 customers. Thus we find a total of 360 customers arriving over a 3 hour time frame, or 120 customers per hour, on average.

3.1.2. What Is BH's Throughput Capacity?

Since a BH restaurant has 14 tables, with 8 seats per table, it can serve 112 customers at a time. Since customers stay one hour, it has a throughput capacity of 112 customers/hour, or 336 customers per night, given the 3-hour arrival period. (There is some room for interpretation here – alternately, one might say the capacity is 448 customers per night, since one group of arrivals could be admitted at 6 p.m., another at 7 p.m., a third group at 8 p.m., and a final group at 9 p.m. However, for our analysis, we will use 336 customers per night as the capacity number.)

3.1.3. How Can BH Increase Its Throughput Capacity? (Slide 4)

Since demand exceeds capacity (demand is 360 customers/night, capacity is 336 customers/night), BH would like to increase its capacity. (Later, we will see why a firm might want to increase its capacity even if demand were below capacity, but for now suffice it to say that we simply would like capacity to be greater than demand.) The options for increasing capacity are:

- **Add more tables and chairs.** But this takes a bigger facility, meaning more capital investment.
- **Decrease the dining time.** The question is, can we decrease the dining time while maintaining, or even enhancing, the dining experience?

3.1.4. How Does BH Decrease the Dining Time? (Slide 5)

BH has already done a number of things to decrease the dining time, and thereby increase its capacity. These include:

- Short menu reduces customer decision time.
- Order doesn't sit in a queue waiting for the chef to prepare it.
- Food doesn't sit in a queue waiting for the server to deliver it to the customer.
- Chef pre-trims the fat off the meat.
- Chef force-feeds the customers, throwing them morsels of food.
- Customers focus on watching the chef, rather than on conversation.
- Sitting with strangers discourages anything but small talk.
- The dessert is ice-cream, which melts fast near the hot grill.
- Chef bows at the end of the presentation, signaling it's time to leave.
- Seats are designed to give fanny-fatigue.

While customers might typically be insulted by a push toward reduced dining times, BH has found a way to reduce dining time in a very tasteful fashion. Basically, it has developed a rather regimented dining experience, but customers don't view it as regimented because it is simultaneously a bit exotic and unique, and is perceived to fit the norms of a foreign culture. In other words, it is perceived as a cultural experience.

Since demand exceeds capacity, the restaurant is said to be limited by a bottleneck. BH has reduced the negative impact of this bottleneck by decreasing the dining time, which in effect has led to increased capacity over what BH would otherwise hold. BH is following a sound principle of operations management, which is to *look for ways to increase capacity at the bottleneck*. This is one reason why BH is performing better than a typical restaurant. To find other reasons, we can examine how well a more typical restaurant would perform given BH's demand stream and capacity level.

3.2. What If BH Were Configured as an Enhanced Restaurant (No batching, no bar)?

Today, many restaurants have bars, and even a few have adopted BH's style of batching customers. (For example, K-Paul's Louisiana Kitchen, a well-know Cajun restaurant in New Orleans, follows this practice.) However, at the time of the BH case, bars within restaurants were less common, and batching of customers was even more rare. To see the degree to which bars and batching of customers leads to improved performance, we run the following simulations.

3.2.1. How Many Customers Are Served with BH Configured as a Typical Restaurant? (Slide 6)

We run the simulation with batching turned "off" and simulate having no bar by configuring the bar with zero seats. The simulation is run multiple times at this setting (Slide 7). (If you were managing the restaurant, would you base an analysis on only one night's observations, or would you come back multiple nights to make sure there weren't any unusual factors present that one night to affect your observations?) Running the simulation ten times, we find an average of 166 dinners sold, with a standard deviation of 9. (Your numbers may differ slightly.) Since we have no bar, we sell no drinks.

3.2.2. What Is Utilization Under This Configuration of a Typical Restaurant? (Slide 8)

As indicated earlier, demand of 360 customers exceeds capacity of 336, so in theory, the restaurant should always be full (utilization should be 100%), and 336 customers should be served. Yet, we find only 166 customers are served, indicating that utilization is only $166 / 336 = 49\%$.

3.2.3. Why Is Utilization So Low? (Slide 9)

After some discussion in class, it will become apparent to students that *variability* is the only reason full utilization isn't achieved. We find the following types of variability:

- **Variability in demand.** Demand variability shows up in two forms:

- **Cyclical variability:** Some of the demand variability is predictable: In the middle of the evening, customers arrive at a faster rate than during early or late evening. (In other industries, cyclical variability may occur over multiple years, seasonally, daily, or hourly, for example.)
- **Stochastic variability:** Some of the demand variability is unpredictable. Not all customers arrive at the top of the hour, and we simply can't predict exactly when they will arrive.
- **Variability in the size of batch.** Customers arriving in batches of, say, five, will occupy a table that could hold eight, leaving three seats empty during the time those customers are dining.
- **Variability in service times.** Even if all customers arrived evenly at the top of the hour in batches of size eight, we would turn some away because of variability in service times (if customers stay an hour on average but some stay longer than an hour, then those tables are not ready at the top of the hour when new customers arrive).

If everything were deterministic rather than variable, that is, if there were no rush hour for demand, if all customers arrived at the top of the hour, if all customers arrived in batches of eight, and if all service times took exactly one hour, then the restaurant would always be busy and we could achieve 100% utilization. Thus, *variability prevents us from achieving full utilization!*

This also points to another principle of Operations Management: *Capacity that goes unused is lost forever.* We can't go back in time and fill the tables that went empty early in the evening with customers who arrive later in the evening.

3.3. How Does BH Control Variability? (Slide 10)

Given that poor utilization stems from variability, it behooves BH to eliminate or reduce this variability. We now investigate how this is achieved.

3.3.1. How Does BH Control Cyclical Variability in Demand?

It doesn't. At least we have no evidence to this effect – but one idea would be to offer an early-bird special, for example.

3.3.2. How Does BH Control Stochastic Variability in Demand?

The bar essentially eliminates stochastic variability for the restaurant. In other words, the random arrivals are staged in the bar and then released to the restaurant at the prescribed time.

3.3.3. How Does BH Control Variability in Batch Size?

Since customers are batched in groups of eight before entering the restaurant, this variability is eliminated.

3.3.4. How Does BH Control Variability in Service Time?

All of the things that lead to reduced dining time (see item 5.1.4.) also lead to reduced variability in dining time. By having the chef set the pace for the meal, the dining time can be pre-determined to a large degree. The chef can be trained to offer a one-hour performance, plus or minus only a few minutes.

Thus we see that, from the restaurant's perspective, variability has been largely reduced, by: 1) The bar, 2) Batching, and 3) Having the chef set the pace. Using the simulation, we can examine how much each of these first two factors increases the utilization of the restaurant.

3.4. How Much Does the Bar Increase Utilization and Profit? (Slides 11 and 12)

With the bar at the standard 55 seats and no batching, we find 191 dinners sold, with a standard deviation of 14 (avg. of ten runs – your results may differ slightly). This results in a utilization of $191 / 336 = 57\%$. Thus the bar increases the number of dinners sold by 25, or increases utilization by about 8%. Importantly, while helping the restaurant, the bar also adds extra revenue by selling 391 drinks, which are a high margin item. In fact, as calculated in Table 2, the bar (without batching) increases profit by 70%. The bulk of this increase (nearly 80% of the 70% increase) comes from drink sales.

3.5. How Much Does Batching Increase Utilization and Profit? (Slides 13 and 14)

With the bar and batching, we find 296 dinners sold (with a standard deviation of 30). Utilization increases to $296 / 336 = 88\%$, that is, it increases by another 31%. But we find that, even with these drastic improvements, BH fails to achieve 100% utilization. Thus, we observe another principle of Operations Management: *An operation generally cannot run at full capacity*. Reducing variability helps increase capacity utilization, and variability reduction should be aggressively pursued, but elimination of all variability is likely unachievable or impractical. Sometimes, as a rule of thumb, it is suggested that an operation should run at something like 80% capacity – Higher utilization results in excessive inventory, while lower utilization suggests the operation has acquired unnecessary resources. (Of course, the optimal utilization level is situation-specific.)

The effect of batching on utilization was more dramatic than the effect of simply adding the bar (without batching). But interestingly, batching actually reduces the number of drinks sold to 217 (as compared to 391 with the bar but without batching). In other words, batching gets customers out of the bar and into the restaurant more quickly, giving them less time in the bar to buy drinks. With batching, profit increases by 38% as compared to the baseline (see Table 2: Effect of the Bar and Batching on Profit² below). In summary, the effect of batching is more dramatic than the effect of a bar in regard to utilization, but the effect of batching is less dramatic than the effect of a bar in regard to profitability.

Table 2: Effect of the Bar and Batching on Profit

	Batching:			
	OFF	OFF	ON	ON
Bar capacity:	0	55	0	55
Drinks sold	0	391	0	217
Sales price, \$/drink	\$1.50	\$1.50	\$1.50	\$1.50
Cost, \$/drink (20%)	\$0.30	\$0.30	\$0.30	\$0.30
Gross profit, drinks	0	\$469	0	\$260
Dinners sold	166	191	166	295
Sales price, \$/dinner	\$7.30	\$7.30	\$7.30	\$7.30
Cost, \$/dinner (30%)	\$ 2.20	\$ 2.20	\$ 2.20	\$ 2.20
Gross profit, dinners	\$847	\$974	\$1,183	\$1,505
Total gross profit	\$847	\$1,443	\$1,183	\$1,765
% increase over base	Base	70%	40%	108%

Together, the bar and batching of customers increase profit by 108% over the baseline condition. (Slide 15)

3.6. How Long Do Customers Wait in the Bar? Do They Mind the Wait?

As we see from the simulation results, the bar is a very important asset for increasing profitability. Should BH be concerned about how much time customers spend in the bar? For simplicity, assume 15 tables in the restaurant and 60 seats in the bar (see Slide 16). With 15 tables and a stay of 60 minutes/table, a table clears every 4 minutes, on average. When a party enters the bar it puts its name at the end of a list, and enters the restaurant when it gets to the front of the list. With 60 people in the bar and parties of 8, it takes 7.5 parties of 8 to get from the end of the list to the front of the list. Since 4 minutes elapse between parties leaving the bar to enter the restaurant, the average time spent in the bar is 7.5×4 minutes = 30 minutes. Since customers buy a drink every 12 minutes on average, this is enough time to get about 2 drinks.

Students familiar with Little's Law will do the problem more quickly (Slide 17): $L = 60$ customers in the bar, and $l = 8$ customers / 4 min. = 2 customers / min., yielding $W = L / l = (60 \text{ customers}) / (2 \text{ customers/ min}) = 30 \text{ min.}$

The simulation does take into account the fact that customers may leave without buying a dinner if the wait in the bar is excessive, but does not take into account the possibility that excessive waits in the bar may make customers less likely to return for repeat business. Customers probably don't mind the wait up to a point, but remember, at the end of the day, BH is a restaurant and not a bar. Also, some customers may imbibe a bit too much if the time in the bar gets excessive. Who wants to end up sitting at a table next to a drunk stranger? (Slide 18)

3.7. What About BH's Financial and Marketing Objectives? (Slide 19)

To this point, we have focused on the two operational objectives of:

- **Increased capacity**, and
- **Increased utilization of that capacity** (achieved through reduced variability).

BH can also increase profitability by pursuing certain financial and marketing objectives:

- **Increased gross margin**, achieved through:
 - **Reduced labor cost**,
 - **Reduced material cost**, or
 - **Increased price**.
- **Reduced overhead costs** (period or fixed costs), achieved through:
 - **Reduced rent**, or
 - **Reduced depreciation**.

Let's examine which of the above operational, financial, and marketing goals are achieved by three key actions that BH has taken, namely: 1) Adding the bar; 2) Getting the chef out of the kitchen, and 3) Offering a limited menu.

3.7.1. What Does the Bar Do? (Slide 20)

- Facilitates batching, eliminating variability in batch size..
- Virtually eliminates stochastic variability in customer arrivals (the bar releases batches of customers to the restaurant at a regular pace).
- Reduces cyclical variability in customer arrivals (customers who arrive during rush hour may be willing to wait until non-rush).

The lucrative aspect of the bar is that it not only reduces variability for the restaurant, it also makes its own significant profit! No wonder so many restaurants today have bars!

3.7.2. What Does Getting the Chef Out of the Kitchen Do? (Slide 21)

- Reduces service (processing) time by allowing the chef to force-feed the customers and set the dining pace, thereby increasing capacity.
- Reduces variability in service time (there is no queue for order or prepared food, the chef can set a consistent pace).
- Increases the price that can be charged, by:
 - Adding entertainment value,

- Reducing customer anxiety over unfamiliar food preparation, and
- Increasing freshness and appeal of the food.
- Reduces labor cost (there are fewer non-tipped employees).
- Reduces fixed costs (less kitchen space requirement, reducing rent and building cost).

3.7.3. What Does a Limited Menu Do? (Slide 22)

- Shortens customer order time (increases capacity).
- Reduces variability in service time (cooking times are more consistent).
- Reduces total volume of food needed (less safety stock is needed due to pooling).
- Reduces food waste.
- Reduces rent, depreciation (reduces food storage space requirement).
- Reduces food cost (volume purchasing of fewer items).
- Increases quality (less to go wrong in preparation, etc.).

3.8. What Are the Elements of BH's Profitability? (Slide 23)

Having dissected BH's profitability picture, we can summarize the elements of its profitability as follows (see Slide 23). Given that BH is about three times as profitable as a typical restaurant (from Table 1), we infer that about 33% of its profit comes from "typical sources". From Table 2: Effect of the Bar and Batching on Profit² it appears an additional 33% is attributable to the bar ($[\$1,443 - \$847] / \$1,765 = 33\%$), and 19% is attributable to batching ($[\$1,183 - \$847] / \$1,765 = 19\%$). The balance of its profitability as compared to a typical restaurant, $100\% - 33\% - 19\% - 33\% = 15\%$, appears to be due to getting the chef out of the kitchen and a limited menu (even without the bar and

without batching, Benihana would likely be about 15% more profitable than a typical restaurant).

4. Where Does Benihana Fit on the Product/Process Spectrum? (Slide 24)

If you have already discussed the product/process spectrum in class, you may want to discuss where BH fits, relative to other restaurants (see Slide 24). Consider that each batch of customers gets basically the same dining experience. Of course, there will be some difference depending on which chef you get, and depending on what set of strangers you are positioned with. However, any given chef will essentially repeat the same experience for each batch of customers. Furthermore, the menu is limited in offering. This is in contrast to many upscale restaurants, where the menu is more diverse and the service more personalized.

By offering a limited menu, and giving all customers the same basic dining experience, BH has moved itself further down the product process spectrum. If we describe a typical upscale restaurant as a job shop, and describe McDonald's as being positioned further down in the direction of a flow shop (because of its uniform service and limited menu), we find BH somewhere in-between. But you might argue that BH has moved itself a significant distance in the direction of the flow-shop. Its success lies in its ability to make this transition without the customer being aware of it.

5. Why Is Simultaneous Product and Process Design Important? (Slide 25)

The case can also be used to introduce the idea of concurrent product and process engineering. Consider what might have happened if BH had separately designed the product and process. Marketing may have come up with the idea of having entertainment to increase price. Possibilities might include hiring a clown, hiring a band, or hiring a dancer. All of these cost money. On the other hand, if think of the product and process concurrently, we find that part of the process (the cooking) can become part of the product (entertainment) if we take the chef out of the kitchen. By getting the chef out of the kitchen, we simultaneously reap all of the benefits listed earlier.

The class can be polled as to the level of culinary expertise of the chefs. Most students will suggest they are exquisite chefs, because of their substantive training. However, the limited menu and style of preparation probably do not require an extraordinary skill level. What *does* require extensive training, and what the chefs are particularly skilled at, is the entertainment function. Specifically, they are trained to handle knives and

utensils adeptly and with showmanship. Do you want an amateur throwing knives in front of you?

6. What Does BH's Process Flow Diagram Look Like? (Slide 26)

Students may find it helpful to draw a process flow diagram, to get a better picture of how BH efficiently manages the flow of customers and materials. A key point is that the bar acts as both an inventory queue and a server (if triangles are used for queues and circles for servers, the bar is both a triangle and a circle). Customers are queued up in the bar while waiting to be served in the restaurant, while simultaneously getting served drinks in the bar. Efficiency is also promoted by having one chef serve two tables. A possible process flow diagram is given in Slide 26.

7. The Rest of the Story

7.1. Should Benihana Expand into the Conventional Restaurant Business? (Slide 27)

In 1985, flush with success, Rocky opened a seafood restaurant in Miami called "Big Splash". This restaurant had a completely different operating system from Benihana. It offered a wide selection of seafood items prepared in any of 20 different ways (Key West, Mexican, Chinese, French, etc.). An excerpt from a 1986 Restaurant News article titled "Big Splash gets only a small wave" states:

As can be imagined, the enormous number of preparation styles created difficulties in the kitchen and complaints of long waits by customers.

When Rocky tried to create a more conventional sit-down restaurant, he ran into operational problems. The point is, operational advantages that may seem obvious or even trivial may not be so easy to copy.

7.2. Is BH's Competitive Advantage Sustainable? (Slide 28)

BH's performance, as we have analyzed it in the simulation, is predicated on a demand stream of 360 customers per night. Students might be asked to consider whether this demand rate is sustainable. Will customers continue to

flock to BH as the novelty wears off? Will competitors be able to duplicate the BH experience?

With the aid of hindsight, we can see that BH has apparently not been able to sustain its position as being three times as profitable as a conventional restaurant. As suggested by the Washington Post article “The Cutting Edge of Japanese Steak” (Dec. 8, 1995), a number of competitors have entered the field, and BH’s demand is probably no longer exceeding its theoretical capacity, at least not day-in and day-out at most restaurants. BH’s stock price suffered quite dramatically in the mid-to-late 1980’s and early 1990’s, as shown in Slide 28.

7.3. *Wall Street Journal*, May 21, 1998: “Ex-Benihana Chief is Under Investigation” (Slide 29)

Rocky H. Aoki, who resigned as chairman and CEO of Benihana Inc., is under criminal investigation for his alleged role in an insider-trading scheme involving the once highflying Spectrum Information Technologies Inc., according to law enforcement officials. . . . Spectrum was about to hire John Sculley, then chairman of Apple Computer Inc. . . . (Rocky Aoki allegedly) relied on (longtime friend) Mr. Kessler’s information about the Sculley hiring and bought thousands of shares of Spectrum Stock. On the day Mr. Sculley was named chairman, the company’s stock soared 46% on daily volume that ranks among the heaviest ever in NASDAQ Stock Market trading. (Rocky Aoki) made a profit of \$590,000. . .

8. What Are the Key Lessons from the Benihana Case? (Slide 30)

- Look for ways to increase capacity at the bottleneck.
- Capacity that goes unused is lost forever.
- Variability is BAD, BAD, BAD. Minimize or eliminate it.
 - Variability in demand (cyclical, stochastic, and batch size variability).
 - Variability in processing times.
- Practice concurrent product and process engineering.
- Design each component (such as “cooking”) to perform *multiple* functions.