BUS 125 Sonic Restaurant

Introduction

Sonic, founded in 1953 by Troy Smith, is one of the largest chains of drive-in fast food restaurants in the United States. Originally started as Top Hat Drive-In in Shawnee, Oklahoma, Smith created the prototype for Sonic when he observed drive-in restaurants use speakers for ordering. He suspected he could increase sales through a controlled parking system, ordering food from speakers located near the cars, and delivery through carhops. Since then, Sonic has evolved to individual brightly lit menu displays complete with intercoms stationed at each parking space, while continuing the classic American tradition of carhop delivery. A "carhop," derived from hotel "bellhops," is a person who brings food out to customers in their parked cars at drive-in fast food restaurants. Drive-in style restaurants was an iconic part of American culture in the 1950's (Fugate, n.d.). Though it has been phased out and replaced with drive-through, Sonic maintains the practice and touts it as part of their brand and marketing strategy. Customers can be at their own pace without being stressed out about the line behind them.

The purpose of this paper is to determine whether or not Sonic's business model is more efficient than other fast food chains by using simulations. Simulations will help explain why Sonic uses its current business model and what things can be improved. We chose to study about Sonic because with the amount of steps workers have to walk each day, we want to know if salary and employee satisfaction at a traditional drive-in workplace influence their job performance. At peak hours, workers have to serve a high volume of customers, so we want to study how they effectively make use of their time and the quality of customer service they provide.

Simulation:

Our group's goal was to create an accurate simulation that would display, on average, the total amount of steps taken by an average server at a specific Sonic restaurant. Due to resource and time constraints our experiment assumes a number of independent variables that may not be accurate to apply to every sonic franchise. Firstly, we assume the amount of cars that show up to the restaurant for an 8-hour shift from 10 am - 5 pm pacific standard time. This is because we want to take into account the most popular times at restaurants which includes Lunch (11 pm-12 pm) and Dinner (5 pm) to ensure we are factoring in major changes to employee exertion patterns. Furthermore, we are also assuming the following layout of the Sonic restaurant as seen in Figure 1. This is because we only had the time to fully analyze one type of branch. In addition, we also assumed the amount of cars that would show up each other based on personal and physical observations due to time constraints. We also make the assumption that any car that enters the Sonic parking lot has an equal chance to choose any parking spot on the lot. This is because this specific Sonic restaurant has two entrances from the minaline street that allows cars to settle at the two extremes of the parking lot. Finally, we are also assuming that it takes an exact and measured amount of steps to reach each parking space. To limit inconsistencies we took the average steps it took to reach each parking space from a total of 5 trials.

With assumptions out of the way, our experiment focused on one Sonic server and how many steps they take over the course of an 8 hour shift. To do this, we first assigned each parking spot a number between 1 and 12. This allows us to easily identify which parking space is being described when using excel functions. With our parking spaces defined we made use of a RANDBETWEEN() function to randomly choose which parking spaces would be filled at any given time. In the cells across from this function we added a chained IF() statement that contained the arguments to check the RANDBETWEEN() cells to match the amount of steps to the assigned parking space number. The amount of steps it took to reach each parking space is as follows:

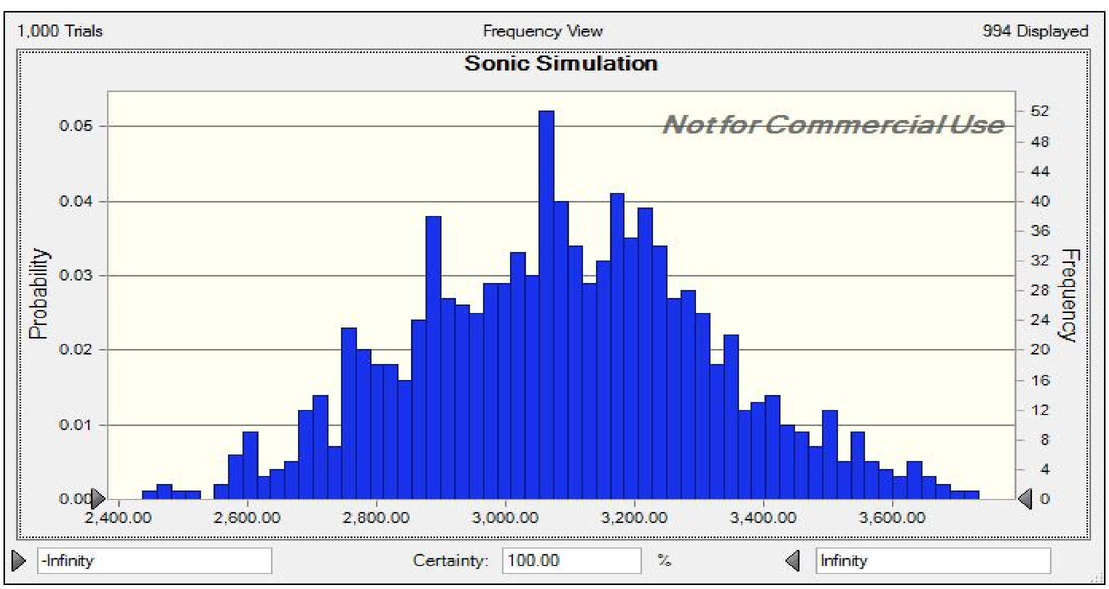
PS	1	2	3	4	5	6	7	8	9	10	11	12
Step	5	10	15	20	30	20	24	29	35	38	53	60

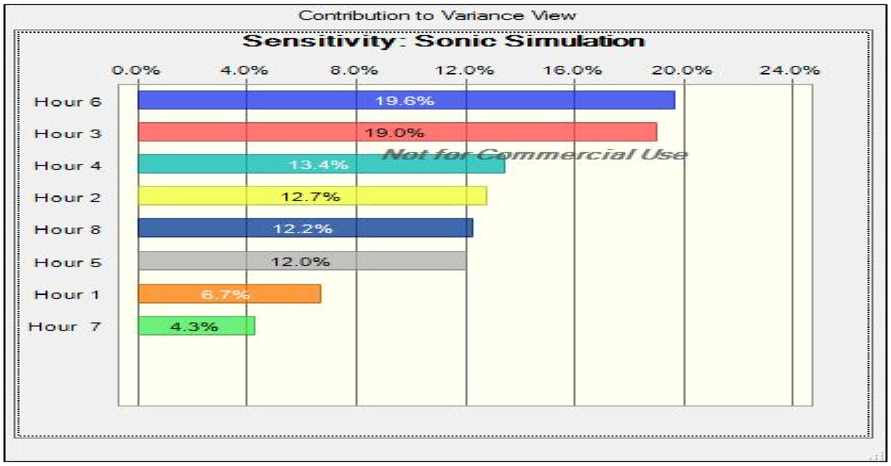
We then place functions in the respective cells, equal to the amount of expected visitors to the restaurant (Ex: If we expected 4 customers then we used the RANDBETWEEN() function to report which parking space was occupied 4 times, followed by checking those 4 cells with IF() statements to assign the respective amount of steps. The assumed amount of customers per hour from 10am - 5pm is as follows:

Time	10am	11am	12am	1pm	2pm	3pm	4pm	5pm
Visits	4	5	8	10	8	6	5	7

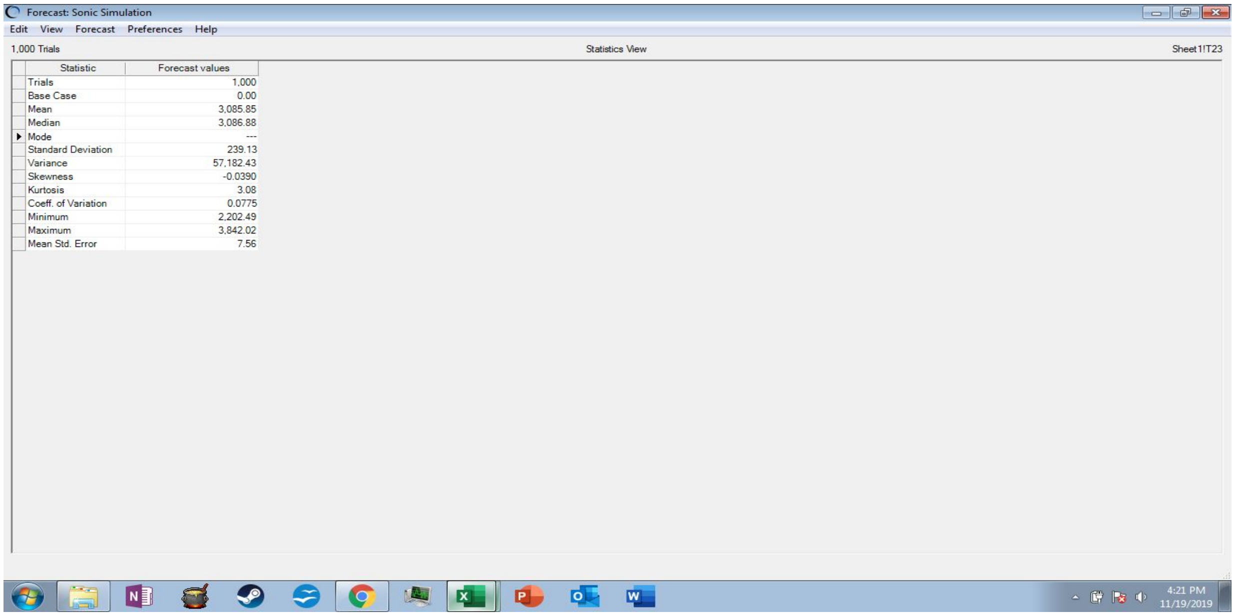
After we gathered our data from EXCEL, we then decided to take the total amount of steps per hour a total of 10 times to ensure that we had a variable sample size that was not negatively affected by any potential outliers. To run our simulation we decided to organize it into how many steps were taken per hour with each hour using normal distribution. We chose to use normal distribution since the variable (Number of steps) we are using can be considered continuous. This is because different people have different walking patterns, gaits, or foot size that can affect the average amount of steps that they walk during a given period of time. We then set a forecast in Crystal Ball that calculated the total amount of steps in a given workshift based on 8 hours ed normally distributed. Furthermore, we added a cell called “Number of Trips Per Server” which assumes that each server only makes a set amount of trips to and from the restaurant to the parking lot. This is to account for the fact that the Sonic Restaurant usually has multiple waiters that attend to customers in the parking lot at any given time. The number can be modified by the responsible parties to indicate/compensate for the amount of staff that should or are assigned to the parking lot at any given time during their shift.

The simulation was run using 1000 trials using the given data. The result was that the highest average amount of steps taken by a single server was at 3,085 or a little more than half a mile, with extremes being measured at 3,900 steps (Max) and 2,356 steps (Min). The hour that had employees taking the most amount of steps was, according to sensitivity analysis, hour 6 (3 pm) at 19.6%, which indicates that Sonic often has customer park in faraway parking spaces if said space is available.





Furthermore, the results show that when there are more customers, the 2 server plan they have in place is exceptionally performing spreading the amount of physical exertion amongst staff. This is shown by the lower amount of steps taken by the average server when the restaurant is almost filled to capacity (Hour 4). However, upon running additional iterations of the simulation we found that different hours often become the culprit for the most amount of steps taken, but only by little bits (Less than a percentile). This indicates that consumers in less busy hours tend to park far away from the restaurant despite potentially closer spots available. Other than this aspect, many of the statistics remain relatively similar to each other, indicating a consistency in employee behavior when serving customers. The small standard deviation of 239.13 also indicates that there is not much potential for difference from the mean, meaning that workers generally have a consistent amount of footsteps to reach each parking space.

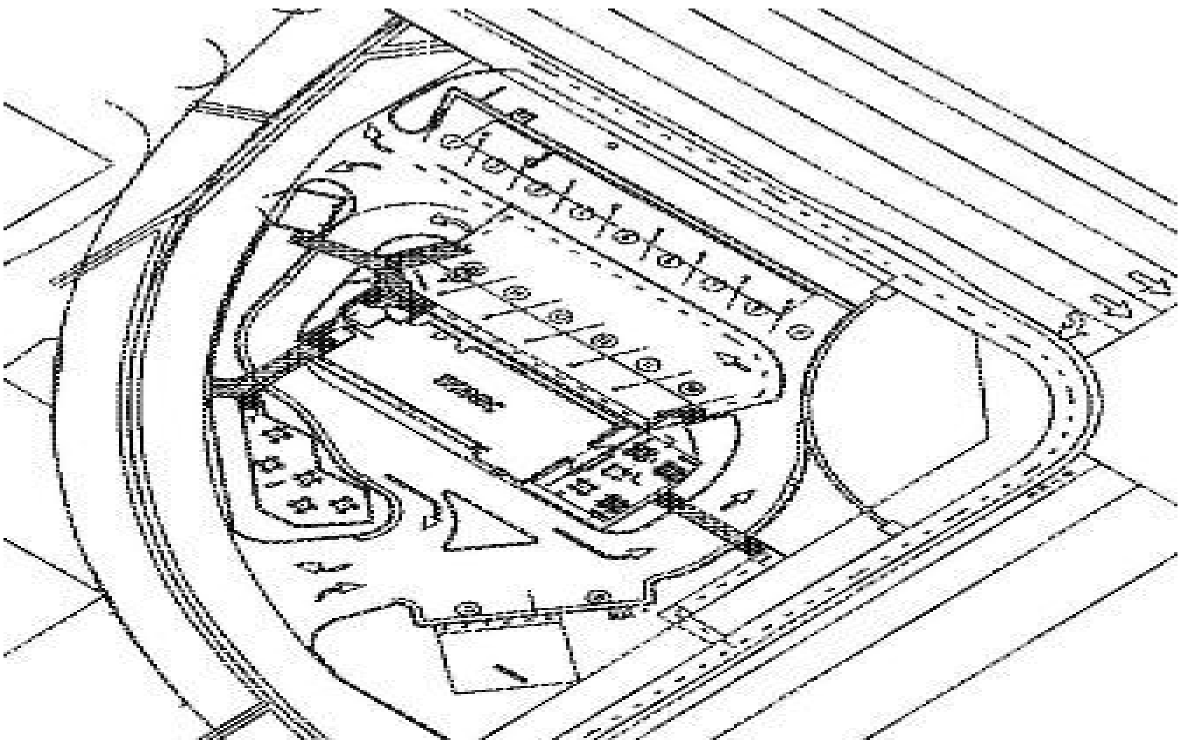


Forecast: Sonic Simulation

Edit View Forecast Preferences Help

1,000 Trials — Statistics View — Sheet1!T23

Statistic	Forecast values
Trials	1,000
Base Case	0.00
Mean	3,085.85
Median	3,086.88
Mode	---
Standard Deviation	239.13
Variance	57,182.43
Skewness	-0.0390
Kurtosis	3.08
Coeff. of Variation	0.0775
Minimum	2,202.49
Maximum	3,842.02
Mean Std. Error	7.56



Goodness of Fit Test:

The goodness of fit test is used to see if sample data represents the distribution of a certain population. We can use the goodness of fit test to check if the simulation that we created can properly represent the data that we collect at the Sonic restaurants that we observed. The goodness of fit test requires two parameters in excel which are an observed range and an expected range. The observed range is the range that we noted at the sonic restaurant. For this simulation, we used the steps to each parking lot, these numbers can be found simulation section of this paper and found the average number of steps to each spot. This gave us the number 27.833. Using the average number of steps, I was able to find how many steps were taken each hour. I used the average number of steps and multiplied it by the number of people at each hour which gave the numbers above. For hour one, four people came in, so multiply four by the average number of steps to each spot, which was 27.833. We were given one 111.333. The observed steps table is as follows:

Hour	1	2	3	4	5	6	7	8
AVG Steps observed	111.333	167	222.667	306.167	222.67	167	139.167	194.833

The expected number of steps is the average number of steps at each hour that our simulation gave. After running the trails and ending up with ten different sets of averages at each hour. To get the expected average number of steps, We simply added the number of steps at each trail then divided them by the total number of trials. For example, The first-hour trials gave us ten different averages which totaled to 1166, 129+114+153+117+116+144+55+125+134+79, then divided it by ten resulting in 116.6. The expected steps table is as follows:

Hour	1	2	3	4	5	6	7	8
AVG Steps expected	116.6	167.5	223.9	268.6	232.2	172.7	157.9	200.3

Using these two tables, we are able to create a goodness of fit function. We used the chi square goodness of fit function. This returns value from the chi-squared distribution for the statistic and the appropriate degrees of freedom. Essentially, allows you to determine if the results are verified for an experiment. In our case, the function returned a 0.32.

Generally, a value that is less than 0.10 is considered to be significant. Our result of 0.32 is much larger than 0.10, which means that our simulation is not significant. This means that our solution does not imply a meaningful difference. We fail to reject the null hypothesis. There are a number of variables that can lead to this. The first and maybe largest is that our data is not completely accurate. The number of steps changes from person to person depending on the shoe size, the height, and other variables from individual to individual. The time restriction as played a role in gathered useful data from the restaurant. Our initial observed steps could possibly have not been a perfect representation of the Sonic restaurant. Our simulation did not properly display the average number of steps taken by a specific server at Sonic.

Recommendations for Future Experiments:

Though our group managed to complete the simulation in a timely manner, due to time and resource constraints we were not able to produce the best simulation possible and would thus like to recommend potential considerations to rectify said problems. Firstly to to simply gather more data over the course of many more days such as a month. We were only able to observe the Sonic for one day and thus could have accepted possible outliers outside of the business's usual practice such as the amount of servers in the parking lot. By spending more time to gather data one would reduce the amount of potential outliers and account for strange or inordinate behavior of the business. Another factor to consider is the waiter’s amount of steps when carrying food to and from the parking compared to when they take orders. When a server is carrying food they sometimes walk slower or take more amounts of steps to ensure they do not drop the food. As a result this is a potential variable that should be tracked in the future to ensure accurate step metrics. In addition, special consideration should be given to the number of cars that actually show up on a daily basis. Again, our group were limited by time constraints and could only assume the amount of cars that show up within a days period, as a result our data might be skewed toward a specific day rather than normal behavior. This can be remedied by a longer data gathering period. Another way to improve upon the simulation to examine other hourly periods rather than the 10 am - 4 pm time period as well as smaller time periods. This could reveal a connection between working longer shifts and the amount of steps taken to each parking space and could be a valuable information when it comes to hiring for the company. Building on top of this, one should examine the amount of steps taken at the beginning versus the end of the shift since workers may take shorter steps at the end of the shift due to fatigue vs the beginning of the shift where they are fresh. Yet another recommendation is to examine other layouts of the Sonic restaurant. Our group only examined one type of restaurant (Fig 1) despite their being multiple layouts around the US. This means our data cannot help these branches, so by examining these different branches a future simulation can account for them. Another recommendation is to see how the cooks in the kitchen interact with the servers. Oftentimes, servers meander when waiting for an order to be ready, thus they may unintentionally exert themselves during their shift and thus can act as valuable data to the true exertion of an employee. Furthermore, trying the simulation in various parts of the country that have different cultural values and eating times can be key to building an all encompassing simulation for the area in question as different regions eat at different times, which is key to taking understandable and more accurate data.

Solution 1: Order Ahead App

Though their branding remains loyal to their traditional American roots using drive-in and carhops deliver, they are branching out to leverage technology to drive sales such as promoting their app. One solution to reduce the steps that servers have to take and save time is to encourage more customers to use Sonic's "Order Ahead" app. The app allows customers to browse the menu, customize their order, add items to their bag, and pay for their order using a credit card or a Sonic gift card. Because customers pay in advance, all they have to do is park and use the app to check in, then food will be delivered to them. By ordering ahead, it saves one trip for servers because they do not have to go to the car and take the order or complete a cash payment. The Order Ahead app is particularly beneficial for a 24-hour Sonic restaurant, as an app allows for customers to order, pay, and schedule pickup times on smartphone device within arms reach at any hour of the day.

A method that helps servers efficiently hand out the food is to have several designated parking spots for customers who use the Order Ahead app. The Order Ahead not only reduces time and steps for the servers, it also provides convenience to customers who go to the restaurant only for pickup. By having the parking spots closer to the food exit, it reduces steps for the servers. This sort of expedited food pickup section makes using the Order Ahead app more attractive for customers. It removes the wait time for servers to pick up payment (continuing the assumption that the customer pays in cash) and for the kitchen to prepare the order.

Solution 2: Blocking Spots

According to the data we gathered, there seems to be some discrepancy with which hours influence the amount of steps. This is because consumers are equally likely to choose any parking space in the lot, regardless if parking spots close to the restaurant are open or not. This results in customer parkinging in farther away spaces than is necessary, increasing the amount of steps a waiter must take to reach the car for little to no apparent reason. Thus I suggest the solution of using cones to block parking spaces that are far away from the restaurant during hours where very little consumer activity is taking place. By using cones to block off parking spaces that are far away during downtime, the business prevents consumers from taking the worst spots possible, those far from the restaurant. As a result, servers will have to travel shorter distances during downtime preventing needless physical exertion. If more customers come in than expected during a given time, cones can easily be removed to facilitate more customers. This solution is incredibly cheap since cones are a relatively minimal asset that requires little maintenance and upkeep. In addition, moving cones is an easy task that no staff member will have to spend a significant amount of training on and thus will not disrupt employee workflow. Furthermore, cones can easily be moved, and since the business has no additional room to actually expand the parking lot (without significant cost), the cones can be moved to different problem parking spots that may be more difficult for workers to get through. Cones could also be used to inform employees of which exit they should take to reach customers. This is achieved by the bright colors of the cones forewarning the waiter that a section is blocked off and thus prevent them from making needless physical effort walking from exit to exit.

Solution 3: Exit Only

Looking towards the physical layout of the Sonic restaurant, there are potential changes we can make to help reduce the average number of steps a Sonic employee takes. Currently, there are two entrances and two exits. If people only park in the spots that are closest, this would mean people can enter through either side of the street and will park in whatever spot. The restaurant could have people park anywhere in the parking lot. If we remove one of the entrances and change it to an exit only, the one that is further away from where the employees make the food, this could reduce the amount of steps taken. When people enter they will park closer to the actual restaurant. This would mean the parking spots that are furthest away from the restaurant are less likely to be used. It restricts where the customer can park without actually restricting their choice. This will reduce the overall average steps taken by the servers at Sonic.

Conclusion:

In closing, it is important to not only calculate the mental state of workers, but their physical state as well. Many restaurants and businesses often try to measure mental aptitude and health but neglect the physical ramifications of employees and their jobs. Should an employee become exhausted they will prove to be inefficient and just as damaged as if they were mentally strained. This is especially true for “old-school” like restaurants such as Sonic, which depends on employees to endure additional physical strain to bring the feeling of classic American restaurants to their customers. We chose this topic because most businesses incorrectly assume that if a job requires little critical thinking, that the job will inherently put less stress on an employee. As our research shows, employees must constantly put a heavy amount of physical strain just to work a simple 8 hour shift. If more research is done regarding this topic, businesses can ensure that employees are put under minimal physical and, by extension, mental strain, and improve their overall work efficiency.

Works Cited

Fugate, T. (n.d.). The Encyclopedia of Oklahoma History and Culture. In *The Encyclopedia of Oklahoma History and Culture*. Retrieved from https://www.okhistory.org/publications/enc/entry.php?entry=SO007

Klein, D. (2018, June 27). Sonic's Digital Strategy Could be a Game-Changer. Retrieved from https://www.qsrmagazine.com/finance/sonics-digital-strategy-could-be-game-changer.

MarketLine, a Progressive Digital Media business. (2018). MarketLine Company Profile: Sonic Corp. Sonic Corp. MarketLine Company Profile (p. N.PAG). Retrieved from https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=134047581&site=ehost-live

Smith, D. (2010, June). The Fourth and Fifth Dayparts. Retrieved from https://www.qsrmagazine.com/menu-innovations/fourth-and-fifth-dayparts.

"Sonic Site Plan Revealed." *Mission Viejo Dispatch*, 20 Feb. 2009, missionviejo.wordpress.com/2008/09/21/sonic-hearing-monday/.

What Makes Our Menu Unique?: SONIC: QSR franchises. (n.d.). Retrieved from https://sonicfranchises.com/research/how-menu-maximizes-dayparts/.