Black Swamp Pub and Bistro Analysis

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Black Swamp Pub and Bistro Analysis

Sara Aniol

HONORS PROJECT

Submitted to the Honors College at Bowling Green State University in partial fulfillment of the requirements for graduation with UNIVERSITY HONORS 5/13/2019

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Introduction
The Black Swamp Pub and Bistro is a full-service restaurant located in the Union on the Bowling Green State University Campus. We mainly do sit-down service, but we also do take-out orders and have a full bar with draft beers as well as mixed drinks. Our menu tends to change a lot, with new additions as well as some of the items being deleted. My goal of this project is to try to give some insight on the patterns that are too big to see with day-to-day operations as well as give some recommendations for the future that is backed by proof and data.

Research Questions
What are the most favorable items at the Black Swamp Pub and Bistro?
Was it a benefit or a determent to change the menu?
What were the most popular items each year? Did this change?
What is the most popular demographic that comes into the restaurant, how can we improve each area?

Literature Review
The Black Swamp Pub and Bistro is a full-service restaurant located in the student union at BGSU. Our menu has changed many times over the years, almost every academic year. We used to be more of pub, and we are slowly moving toward bistro food. In this literary review, because I don’t have much information to go off of, I wanted to look and see what types of food are regularly at Pubs and what foods are regularly at bistros.

I wanted to start with Pub food, because this is what I believe resonates better with the cliental we have on campus. For the most part, pub food tends to be affordable, and tends to be greasy food, which appeals to college kids perfectly. “Rebecca Burr, the editor of the guide, says the “Wild Rabbit prices are realistic for what they're offering . . . We want [the places in the guide] to be proper pubs where drinkers are welcome, but this is a new generation of pubs where the focus is on food.”” (Whittle, 2014) “But if pubs are blurring boundaries, it may be a good thing. As Mr. Kerridge says: "When you walk in to a pub, you know what to do - there's beer and a bar man you say hello [to] and order a pint. It's just that the food you have with it is of a high standard."(Whittle, 2014) Since the Black Swamp offers beer and alcohol, and has affordable prices, I would consider us more of a pub, but the idea of pubs are changing. “Gone are the days when chicken wings and nachos alone represented the beer-friendly menu. These days, the best of the brewers offer a vast range of flavors, in the process helping to distinguish themselves in an increasingly competitive market.” (Disbrowe, 1997)

Bistros tend to be higher end and high class. We wear black shirts and ties, and I feel like that plays more into the bistro feel than the pub feel. “Clagett developed a varied, high-end menu featuring the ubiquitous local, fresh ingredients that are popular in Boulder restaurants . . . . After six years of owning Murphy’s, Frye yearned to open a high-end restaurant, and he had the perfect location in mind - South Boulder.” (Uhland 2008) This is an example of a bistro style restaurant in Boulder. He wanted to open a high-end restaurant with different foods that were cooked as if they were from their native country. This is not what you would have at a greasy pub. Another example of food that you may find in a bistro setting is from Jake and Humphrey’s Bistro, where
a customer wrote a detailed review. “Our eldest chose the Grilled Striploin Steak with Three Peppercorn Sauce ($22) … My husband chose the Lamb Chop Special, served with mashed potato ($33) … My dish was the Braised Beef Short Ribs with Hoisin and Dark Beer Sauce ($22).” (2017) These are all very fancy foods with steep price tags.

The Black Swamp Pub and Bistro seems to be a hybrid of both of these types of restaurants, which is odd for an on-campus restaurant. College students tend to be more fans of pub food, as nearby restaurants can attest to (DP Dough, Wings Over, BG Burgers, etc). The pub started a new program last school year with having items that will be done in under 30 minutes. “We're going to be doing a quick lunch menu, so the goal is certain items can be (ordered, with customers) in and out within the lunch hour.” (Baird 2017) These items were reserved for lunch guests who needed to be in and out quickly. Even though this is efficient, it did seem to not be geared toward the majority of our market, students. The Black Swamp Pub and Bistro is a combination of two concepts, and I want to see if it is working for them.

Proposed Activity

What I will be doing for this project is taking sales/transaction data from the Black Swamp Pub and Bistro and performing extensive analysis on it. I will mainly focus on popular items and how we can try to get more people in to the restaurant. I have been a server there for three years now and have noticed a bit of a decline in sales as well as traffic. I want to help the establishment by exploring new ways of improving the menu/possible promotions that can possibly get more people in the door as well as more sales.

In order to do my analysis, I will need to use multiple techniques. I will be using this project as my Data Science Capstone and will be using data science techniques. This will include data entry, since I will need to organize my data in a way that makes sense to me. I will also be using R in order to do my analysis, even though the data is in an excel file. I will also be performing statistical tests to see how significant my results are. In order to show others my work, I will be communicating with stake holders, and that includes a presentation at the end of the project. For my marketing class, I will be incorporating a brief marketing proposal to help the establishment get some of these ideas off the ground.

Methodology

In order to get my data, it was a process. I had to request the information from the administration of BGSU dining, write a proposal, then go through other women who finally gave it to me. Some of the data is private, which is fine, but I did get a solid group that will be fun to analyze. These data sets are actual data that was acquired from Fall 2015 up until Fall 2018. In these data sets, I have the item name, the group it belongs to (entrée, appetizers, etc.), as well as sales for each month and the quantity that was sold for each month. I also have totals for sales and quantities. I am also waiting on transaction data. This will allow me to see how many students and faculty came into the restaurant.
Expected Results and/or Potential Conclusions

Honestly, I am not sure what I want to find. I am hoping that the menu back in 2015 was more popular, because that would support my observations over the years. I believe I have seen a decline in people coming in, and the data could either support or deny my observations. I do want to see which menu items are the most popular from year to year and see if that changes at all or not. I feel like if the old items were overly popular, the Pub could do a weekly special or something to bring a new crowd in. I also expect to see an increase in staff coming in over the last year, because that has been a priority with the new management.

2. Description of Data

Before being able to do any analysis, there needs to be data first. The data was received from the Black Swamp Pub from Susan Reynolds who is the Operational Controller with BGSU Dining. She was very helpful and was able to get me most of what I wanted in a very short time frame. I received the data through email, and then inputted it into CSV files manually. It was easier to analyze if I did it myself then how it was given.

I was able to receive Pub Sales, that ranged from Fall 2016 to Fall 2018. After that I asked about profits, but that is confidential information. I then was able to receive Payment Types for checks as well as ticket totals per day. This was plenty of information where I could make some good conclusions.

The first set of data I was able to receive were sales and quantity values ranging from Fall 2016 to Fall 2018. These values were split up by month, then had totals in the set as well. In the set I was given, it would look like “Jan Sales”, “Fan Qty” then “Total Sales” and “Total Qty” and so on. We also had the name of the item and the different group it came from. The different groups included appetizer, deserts, entrees, salads, sandwiches, sides and soups. It included everything that was on the menu during that time, even if the item was a special only sold for a week or even a day. For the original data from Fall 2017 – Fall 2018, it was in a different format. We had the category, which was just like the group it was from, but then we had the name of the item, the item number, the quantity and then the unit price. In order to make it similar to the other data, I multiplied the quantity and the unit price to get the sales. For this part of the data, we didn’t have the numbers split up by month, so when I converted the original data into my own data, I put “NA” for those values.

For the same time frame, I was able to obtain the payment types as well as the ticket counts for watch day. The payment types were cash/credit card, BG1 card, meal plan and catering/department charges and then the total for each year. The payments were split up by semester, and the values were total amount that had been paid with each type. For the ticket counts, it was split up by day of the week, with totals at the bottom. They were unable to do patron count because of how the checks are done at the pub. Sometimes, especially near the end of the year, large checks are paid by one person, so there is no way to tell how many people actually came in, but we could easily tell how many checks there were.
Below are examples of each of the data sets I was working with.

<table>
<thead>
<tr>
<th>Item</th>
<th>Family Group</th>
<th>Jan Sales</th>
<th>Feb Sales</th>
<th>Mar Sales</th>
<th>Apr Sales</th>
<th>May Sales</th>
<th>Sales Total</th>
<th>Jan Qty</th>
<th>Feb Qty</th>
<th>Mar Qty</th>
<th>Apr Qty</th>
<th>May Qty</th>
<th>Total Qty</th>
<th>Total Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2016</td>
<td>FRIED CHEESE</td>
<td>3454.01</td>
<td>4955.28</td>
<td>3602.61</td>
<td>5033.14</td>
<td>611.19</td>
<td>17656.23</td>
<td>584</td>
<td>837</td>
<td>609</td>
<td>852</td>
<td>103</td>
<td>2985</td>
<td></td>
</tr>
<tr>
<td>Spring 2016</td>
<td>HUMMUS PB APPETIZER</td>
<td>341.39</td>
<td>577.1</td>
<td>496.22</td>
<td>631.81</td>
<td>66.02</td>
<td>2112.54</td>
<td>51</td>
<td>85</td>
<td>72</td>
<td>93</td>
<td>10</td>
<td>311</td>
<td></td>
</tr>
<tr>
<td>Spring 2016</td>
<td>PICKLES PB APPETIZER</td>
<td>1632.48</td>
<td>2213.22</td>
<td>1467.47</td>
<td>2087.53</td>
<td>405.9</td>
<td>7806.6</td>
<td>331</td>
<td>449</td>
<td>298</td>
<td>423</td>
<td>82</td>
<td>1583</td>
<td></td>
</tr>
<tr>
<td>Spring 2016</td>
<td>PRETZEL PB APPETIZER</td>
<td>920.7</td>
<td>1381.05</td>
<td>1030.98</td>
<td>1594.36</td>
<td>289.97</td>
<td>5217.06</td>
<td>187</td>
<td>280</td>
<td>212</td>
<td>323</td>
<td>59</td>
<td>1061</td>
<td></td>
</tr>
<tr>
<td>Spring 2016</td>
<td>PUB CHIPS PB APPETIZER</td>
<td>282.15</td>
<td>493.91</td>
<td>328.53</td>
<td>518.19</td>
<td>74.25</td>
<td>1697.03</td>
<td>57</td>
<td>100</td>
<td>67</td>
<td>105</td>
<td>15</td>
<td>344</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Example of the data tables I used. This section is from the Spring data set and includes January–May sales and quantity as well as total sales and total quantity. If there were no values for the months, “N/A” was added to the data set.

<table>
<thead>
<tr>
<th>Item</th>
<th>Family Group</th>
<th>Jan Sales</th>
<th>Feb Sales</th>
<th>Mar Sales</th>
<th>Apr Sales</th>
<th>May Sales</th>
<th>Sales Total</th>
<th>Jan Qty</th>
<th>Feb Qty</th>
<th>Mar Qty</th>
<th>Apr Qty</th>
<th>May Qty</th>
<th>Total Qty</th>
<th>Total Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2017</td>
<td>Spinach Artichoke Flatbread</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>4899.99</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>703</td>
<td></td>
</tr>
<tr>
<td>Fall 2017</td>
<td>North Carolina Chips</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>2885.79</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>338</td>
<td></td>
</tr>
<tr>
<td>Fall 2017</td>
<td>Cheese Fritters</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>9392.32</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1576</td>
<td></td>
</tr>
<tr>
<td>Fall 2017</td>
<td>Classic Chicken Wings</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>2684.16</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>388</td>
<td></td>
</tr>
<tr>
<td>Fall 2017</td>
<td>Fried Pickles</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>7427.6</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1253</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: This is an example of the Fall data set. We did not have many month data for the fall, so “N/A” was put in its place. We do have the name of the item, the family group it is a part of, as well as the total sales and total quantity.

<table>
<thead>
<tr>
<th>Item</th>
<th>Family Group</th>
<th>Jan Sales</th>
<th>Feb Sales</th>
<th>Mar Sales</th>
<th>Apr Sales</th>
<th>May Sales</th>
<th>Sales Total</th>
<th>Jan Qty</th>
<th>Feb Qty</th>
<th>Mar Qty</th>
<th>Apr Qty</th>
<th>May Qty</th>
<th>Total Qty</th>
<th>Total Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2018</td>
<td>Tempura Shrimp</td>
<td>PB APPETIZER</td>
<td>2343.64</td>
<td>186</td>
<td>Fall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2018</td>
<td>Fried Chicken Tenders</td>
<td>PB APPETIZER</td>
<td>11114.75</td>
<td>1026</td>
<td>Fall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2018</td>
<td>Hummus Layer Dip</td>
<td>PB APPETIZER</td>
<td>899.21</td>
<td>129</td>
<td>Fall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring 2016</td>
<td>FRIED CHEESE</td>
<td>PB APPETIZER</td>
<td>611.19</td>
<td>2985</td>
<td>Spring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Payment Type Table 3

<table>
<thead>
<tr>
<th>Payment Type</th>
<th>Fall 2015</th>
<th>Spring 2016</th>
<th>Fall 2016</th>
<th>Spring 2016</th>
<th>Fall 2017</th>
<th>Spring 2017</th>
<th>Fall 2018</th>
<th>Spring 2018</th>
<th>Fall 2018</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash/Credit Card</td>
<td>30471</td>
<td>29051</td>
<td>25766</td>
<td>26372</td>
<td>26896</td>
<td>22929</td>
<td>21100</td>
<td>182585</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG1 Card</td>
<td>1334</td>
<td>1854</td>
<td>1529</td>
<td>1449</td>
<td>1397</td>
<td>946</td>
<td>1796</td>
<td>10305</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meal Plan</td>
<td>188387</td>
<td>274434</td>
<td>187351</td>
<td>257055</td>
<td>143565</td>
<td>202339</td>
<td>124507</td>
<td>1377638</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catering/Department Charges</td>
<td>2224</td>
<td>3709</td>
<td>3712</td>
<td>4927</td>
<td>2794</td>
<td>10164</td>
<td>2245</td>
<td>29775</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4:** This table gives the payment types that have been used, the number of CHECKS paid with each type for different semesters as well as the total CHECKS for each payment type.

<table>
<thead>
<tr>
<th>Ticket Counts</th>
<th>Fall 2015</th>
<th>Spring 2016</th>
<th>Fall 2016</th>
<th>Spring 2016</th>
<th>Fall 2017</th>
<th>Spring 2017</th>
<th>Fall 2018</th>
<th>Spring 2018</th>
<th>Fall 2018</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday</td>
<td>356</td>
<td>434</td>
<td>333</td>
<td>292</td>
<td>286</td>
<td>312</td>
<td>271</td>
<td>2284</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td>214</td>
<td>212</td>
<td>185</td>
<td>84</td>
<td>151</td>
<td>127</td>
<td>105</td>
<td>1078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monday</td>
<td>440</td>
<td>372</td>
<td>317</td>
<td>348</td>
<td>249</td>
<td>244</td>
<td>245</td>
<td>2215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td>360</td>
<td>419</td>
<td>353</td>
<td>373</td>
<td>272</td>
<td>283</td>
<td>218</td>
<td>2278</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td>228</td>
<td>444</td>
<td>376</td>
<td>409</td>
<td>297</td>
<td>332</td>
<td>254</td>
<td>2340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>438</td>
<td>464</td>
<td>195</td>
<td>407</td>
<td>280</td>
<td>233</td>
<td>268</td>
<td>2285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 5:** To see which day is the busiest, these are the total tickets for each semester. The total tickets for each day are at the end.
3. Analysis

Ticket Totals

The first question that I wanted to answer is which days are the busiest and does this change from semester to semester, or even year to year? Normally, you would think no, because you would assume the class schedule tends to be similar for the fall and spring semester. You would also assume that some days are busier than others, just like in most restaurant settings. When we look at graph 1, we can see that there really isn’t an overly busy day when we take the sum of all the data given to us. The highest value is 2340, closely followed by 2285, 2284 and 2278. These numbers correspond with Wednesday, Thursday, Friday and Tuesday.

Graph 1: Total amount of tickets for each day for all the data that I have.

The next question one may ask is, “Does this trend stay the same when looking at each semester? Are all the days similar in ticket totals?” The initial thought would be that the trend stays the same as we go from fall to spring semester. This is very much disproved with the data that was given to me. We can see from the purple graphs, that the trends change from fall to spring. The top graph is from the Fall and the bottom graph is from the Spring. The top day in the Fall is Wednesday, followed by Tuesday then Friday. In the Spring, the top day is Thursday followed by Wednesday then Friday. The same days are the busiest, just in different orders. This is interesting that Wednesday is one of the busiest days just because it’s in the middle of the week, and it doesn’t seem like Wednesday would be a busy day for an on-campus restaurant, but the numbers prove us wrong. The lowest days are Saturday followed by Thursday by large
margins. Saturday makes sense because we are opened for short hours (4-9), but we don’t have the same excuse for Thursday.

Graph 2: For Fall 2016, the above graph is the total amount of ticket totals per day for that semester.

Graph 3: The total tickets per day for the Spring 2016 are graphed here.

We can see again in Fall 2017 that the top days are Wednesday, Thursday and Friday. The lowest days are Saturday followed by Monday. The numbers are a bit more evenly spread out than in 2016. In the Spring, we can see that the top days are Wednesday, closely followed by Thursday then by Tuesday. The lowest days are Saturday by a large margin than Friday. This is interesting, because in the previous graphs, Friday was usually a top day.
Graph 4: For the Fall 2017 semester, the total tickets per day are graphed.

Graph 5: In the Spring 2017, the total tickets per day are graphed.

In the Fall 2018, we can see that the top days are Friday, Thursday and Wednesday. The lowest days are Saturday then Tuesday. In the Spring of 2018, the top days are Wednesday, Friday then Tuesday. If we remember back to 2017, Friday was one of the lowest days but now it is one of the highest days in both semesters.
The main points for these graphs is to show that there is really no pattern to each semester and for each year. The top day changes from semester to semester and from year to year. Saturdays are always the lowest day, but that is because the Pub is only opens half a day. For the most part, it seemed like Wednesday is one of the top days which is interesting, because it doesn’t seem like a day that would be primarily busy. In the restaurant business, the weekends are usually the busiest, so most would think that Friday would be the business day, but that isn’t the case most of the time. Something to remember when looking at these graphs, these are total number of tickets, and not how many people are coming in. It is very common for multiple people’s meals to be on one ticket, especially near the end of the semesters. The primary form of payment is meal plan (falcon dollars), which we will see later, but near the end of the semester many students are trying to get rid of their falcon dollars. These results are large ticket prices
and multiple people on one ticket. But the amount of tickets is still a good way to tell which times are busiest, because the more tickets, the more people.

4. Popular Items

After seeing which days are the busiest, I wanted to see which items were more popular. Our menu has changed a lot over the last couple years, adding items and taking items away. Some of the menu items that were taken away over the past few years have been crowd favorites, so the main reason to do this was to see if these items were actually popular, or if it was just in my head, or if only my customers orders them. We have different categories of food (entrees, appetizers, deserts, salads, sandwiches, sides and soups) and I have split all the food items from my data sets unto those categories. If there are multiple dots, that just means that item was sold for more than one year in that specific semester. I also ordered the points from largest to smallest, so it is easier to see which items are the most popular.

I would first like to start with entrees. We have had many items come and go over the years. As you can see the Crab Mac and the Land n Sea were only offered in the spring and had very low sales. These were most likely specialty items that were sold for a short time and didn’t do very well. The tops items are baked mac and cheese, fettuccine and chicken tenders. The sirloin, spaghetti and the Yuengling shrimp are also high up there as well. The newest menu has gotten rid of the fettuccine, sirloin and spaghetti. According to sales, this may not have been the best choice. If they are selling, they shouldn’t be taken off the menu. Items such as the ribs and the catfish were taken off the menu for a good reason, low sales. The curry chicken is currently on the menu as well as the ramen soup. They could be on the lower end of the list because they have only been on the menu for two semesters, but the items at the top that are no longer on the menu should be reinstated because they did very well.

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**Graph 8:** For both fall and spring, the different entrees from the data I have are graphed here. They are graphed from largest to smallest to make it easier to see which ones are more popular as well as least popular.
The next graph shows that fried cheese, quesadilla and fried pickles are at the top. Two of these items are no longer on the menu, when they really should be. The fried cheese was replaced with the cheese fritters, which are still very high on the list. The quesadilla was versatile, because you could get chicken and cheese or just cheese, which appealed to the pickiest of eaters. The fried pickles recently made a reappearance to the menu, after customers requested them over and over, and they are delivering. The items at the bottom of the list are specialty items that were put in place for a short time, perhaps for a promotion. With items that are no longer on the menu at the top. I would recommend the Pub to consider bringing these popular items back.

Graph 9: For all of our data, the appetizers are graphed here. They are ordered from largest to smallest as well as faceted by fall and spring.

We don’t sell many deserts, but it is still important to look at them. We only have a few deserts on the menu right now, and they are not the top four items on the list. Expresso cake takes the top, and I personally know many people who miss it. The carrot cake is also at the top as well as the coffee cupcake. These items are at the top by large margins but were still taken off the menu. I would assume they were getting too much to make and it didn’t seem to be selling, but by these numbers, they were clearly selling. This tells us people want more options that ice cream, a large brownie and a ginger beer float. They want comfort food, and what is better than a cake?
Graph 10: Deserts are graphed here, from all the years of our data. They are orders largest to smallest as well as faceted by semester.

Salads are a healthier option for both students and staff. The chop-chop salad is by far the highest seller, but that can also be because it was on the menu for longer. The salmon salad is by far the preferred salad that is on the menu at the moment, but it is still middle of the pack. I was surprised that they took the chop-chop salad off the menu, because it seemed to be selling well and the numbers prove that. They should consider bringing that back to the menu as a healthier option on campus.

Graph 11: Salads are graphed here, faceted by semester and ordered from largest to smallest.

As we could assume, there have been a lot of sandwiches that have gone through the system. As you would think, the cheeseburgers are at the top of the list. I am interested to see if this changes, because the Pub just changed their policy, we can only make well done burgers.
The BG BLT is third on our list, but the second item and that is not on the menu anymore. I feel like it is a good option for the picky college student. The pork sandwich and the grilled cheese are also on top, and we currently have a comparable item on the menu. Near the bottom is the andouille sausage sandwich as well as the shawarma sandwich, which are currently on the menu.

Graph 12: Sandwiches are here, graphed from largest to smallest and faceted by semester. There are many different sandwiches from over the years, so I needed to not jitter the item names for it to be more readable.

As we can see, fries are the most popular side item. This is most likely because they are universal, and we usually have pretty good fries. Pub salad is second, for a healthier option for a usually unhealthy meal. I was surprised to see that waffle fries and sweet potato fries are next. We do not have those on the menu anymore and I don’t think we have had them for years. At the bottom is crispy crushed potatoes and kale, one of which is currently on the menu. The data shows that mashed potatoes as better sellers than the crushed potatoes, possibly because they are new and people don’t know what they are, or because people prefer mashed potatoes. I do know that people constantly ask if we still have mashed potatoes, telling the Pub that they should consider bringing them back.
Graph 13: Our different sides over the years and ordered from largest to smallest as well as faceted by semester.

We don’t usually sell soup, but when we do, we sell the French onion. It is by far the best seller for all years. We now have a ramen noodle soup which isn’t on the list, so I am interested to see how that stacks up.

Graph 14: The few soups we have had over the years are ordered from largest to smallest and faceted by semester.
The next graph shows that category of products that sells the most. Are smaller items selling more or are the more expensive larger items doing better? From the graph below we can see that sides, appetizers and sandwiches do the best. Entrees are up there too. Salads, soups and deserts are very low, and don’t seem to be selling well. It is interesting that the smaller items are more popular, even when the higher priced items are the entrees. The smaller items are doing well most likely because they are least expensive, and they are also a lower portion. People who come in often know how much food some of the options are, and may feel over whelmed. Appetizers are up there because customers want a little food before their meal comes out. It is still surprising that since most of the customers are students, they aren’t spending all of their falcon dollars on the high-ticket items, but maybe a few of the smaller items. The takeaway from this is when looking to formulate a new menu, possibly focusing more on the lower prices’ items, or lowering the quantity of food so we can lower the price. This is likely to lead to more sales because the trend is that customers spend more on the lower prices, lower quantity foods.

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**Graph 15:** This graph is here to show which food category is most popular. There was a question of if larger or smaller items were more popular, and this graph shows that the sides are most popular, since they have more dots on the right side of the graph.
5. Sales Comparison

When looking at the top products, we are unable to see when the highest sales are taking place. The common trend that I have observed while working at the Pub is that we get busier near the end of the semester. This is because many students have a lot of extra falcon dollars and need to get rid of them. They bring their friends and pay for everyone’s food. I wanted to see if the numbers proved that theory.

The first table is from the fall semesters from years 2015 – 2018. I took the sum from each of the categories, and that is how I got the information to put in this table. For the years 2017 and 2018, the data I was given was in a different form, and didn’t have month break downs, hence the N/A values. We can see that October was a busy month. It had the highest sales for the three months tested. This is interesting, because it is in the middle of the semester. The more I thought about it, for August and December, the University is only open for part of the month, so the Pub is only open part of the month. This could be why the sales are lower in August and December. Besides that, take note of the total sales and quantity for each year. They seem high, but as we will see in table 7, there is little comparison.

<table>
<thead>
<tr>
<th></th>
<th>Aug Sales</th>
<th>Aug Qty</th>
<th>Oct Sales</th>
<th>Oct Qty</th>
<th>Dec Sales</th>
<th>Dec Qty</th>
<th>Total Sales</th>
<th>Total Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2015</td>
<td>15,891.42</td>
<td>2,998</td>
<td>63,114.82</td>
<td>12,032</td>
<td>31,457.53</td>
<td>5,936</td>
<td>222,416.49</td>
<td>42,323</td>
</tr>
<tr>
<td>Fall 2016</td>
<td>19,535.09</td>
<td>3,699</td>
<td>57,476.78</td>
<td>10,711</td>
<td>28,821.83</td>
<td>5,353</td>
<td>218,357.63</td>
<td>40,878</td>
</tr>
<tr>
<td>Fall 2017</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>174,652.19</td>
<td>21,951</td>
</tr>
<tr>
<td>Fall 2018</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>149,648.29</td>
<td>16,816</td>
</tr>
</tbody>
</table>

Table 6: This table shows the sum of all the sales and quantity for each month as well as total sales and quantity. They are also separated by semester, to show the decrease of numbers.

This table is for the spring semester for years 2016 – 2018. Again, the middle month (March) has the highest sales and quantity, but I have a feeling that is again because in January and May, we only have a few weeks of data because the Pub closes. The main point of this tables to compare the total sales and quantity to the fall table. There is an almost 12,000-dollar difference in the total quantity. This is a clear supporter of my idea that students come at the end of the semester to spend their falcon dollars. I may have been a bit off, because it shows that the Spring semester Is far busier than fall. They come near the end of the year, because they finally realize they have to many falcon dollars.

<table>
<thead>
<tr>
<th></th>
<th>Jan Sales</th>
<th>Jan Qty</th>
<th>March Sales</th>
<th>March Qty</th>
<th>May Sales</th>
<th>May Qty</th>
<th>Total Sales</th>
<th>Total Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2016</td>
<td>59,265.67</td>
<td>11,182</td>
<td>61,619.73</td>
<td>11,522</td>
<td>15,993.29</td>
<td>2,906</td>
<td>309,048.26</td>
<td>57,565</td>
</tr>
<tr>
<td>Spring 2017</td>
<td>59,678.36</td>
<td>10,971</td>
<td>61,995.40</td>
<td>11,334</td>
<td>17,252.35</td>
<td>3,038</td>
<td>289,803.16</td>
<td>52,510</td>
</tr>
<tr>
<td>Spring 2018</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>236,380.67</td>
<td>32,142</td>
</tr>
</tbody>
</table>

Table 7: This table shows the sum of sales and quantity for each month in each semester of the fall. There are also total sales and total quantity for each spring year to show the decline in numbers.
I also wanted to touch on another point regarding these two tables. The numbers decrease as we go year to year. For example, from Fall 2016 to Fall 2017, total quantity drops from 40,878 to 21,951. In my opinion, this can be attributed to lower menu items. The menu items have been decreasing each year, and that is resulting in lower sales. The items have dropped from 51 to 46, to 40 and finally to 36 from years 2015 to 2018. If you are looking to sell more, which all businesses are, you need to offer more options, and more options people like. If you take away the popular items, which has happened in some cases, the old customers might not come in anymore. I knew sales were decreasing, but I didn’t realize by how much.

6. Statistical Analysis

I planned on doing some statistical tests, but with the data I had, it would not make sense. The point of statistical tests is to see if there is a difference in means over a series of time. I did some month data as well as year data, but the means weren’t that similar. The tests would have made more sense if I had daily sales data or weekly sales data. Since the data I had was very broad, the tests didn’t make sense.

If I were to do this project again, I would defiantly request more data. I am very greatly for what I did receive, but to come up with more precise conclusions, I would need more concentrated data. I would have loved to have daily sales/quantity data as well as weekly sales/quantity data for all years I had. It would have also been great to acquire profit margins, and actual patron count instead of just ticket totals. The more precise the data I have, the better conclusions I can come up with. It I were do this in the future, I would try to get as much precise data as I can, but I think I came up with some good conclusion with what I had.
7. **Marketing Portion**

As part of an independent study in Marketing, I wanted to try to make a marketing suggestion for the Black Swamp Pub and Bistro. The Black Swamp Pub and Bistro has a brand, it is currently branded as a high-end, “fancy” restaurant. The employees wear black button up shirts and black pants. It is also branded as a sports restaurant, with three televisions playing some sports channel. Seems to me that they have a branding issue. In order to get more customers, they need to figure out ONE concept and stick with it. This could mean choosing one of the above options, or completely re-branding to a new concept.

From the graph 16 below, we can see who out most common demographic if, students. Students at BGSU have falcon dollars, that they can use many places on campus. It is already paid for, and their primary form of payment for food. We already have them in the bag, but we can also advertise to them more in order to obtain new customers and keep existing ones. We need to do more outreach with the faculty/staff. Credit card/cash is not even a fourth of the graph and department charges is even less than that. I do know that not only staff pay with credit card or cash, but for the purpose of this graph, that is the assumption.

In order to get more faculty/staff to come in, we need to find something that interest them. We need to go to departments and get them interested. Take their suggestions of things they would like to eat and consider making them weekly specials. We need to send emails to them personally, inviting them to eat here. We could even maybe offer discounts for large faculty parties (6 people and up). This would promote more sales and get them in the door to show them how we operate and even show them how good our food is. We did change our hours in Spring 2018 to open at 11 in order to accommodate earlier lunch breaks, but that hasn’t seemed to take effect yet. They may consider bringing back quick meals, done in 30 minutes or less. We also can consider widening the alcohol variety. We only have four drafts (Hogarden, Budweiser, Bud lite and Miller Lite), and different bottles beers. We also have some liquor, but we are limited to what we can do with them (we aren’t allowed to do shots). Perhaps giving the faculty more options on alcohol can get them in the door. We just need to see what will make them come in the door, because we aren’t just a student restaurant, we are a faculty one as well.

In order to bring new students in and keep existing ones, we need to keep them excited. The weekly emails that we receive are boring and don’t get much attention. We need to incorporate a more innovative way to advertise. We need to send out more visually appealing emails, and become more active on twitter, Instagram, etc. Just like with faculty, we need to see what they want to eat, and consider making them permanent menu items. This sort of happened with fried pickles. We took it off the menu, and multiple people ask for them back. We finally got them back, and they are a hit! This could be a good thing in the future, to bring back some favorite items that will bring new people in.

The main point is that we need to get more people in the door. We need to figure out what will bring in faculty/staff and appeal to their needs. I think the discount idea is a good one, because that will benefit both parties. For the students, who are the majority of customers, we need to make the concept something they actually want to come to. The PR from the pub needs to be entertaining and catch the attention of the students. Students don’t want to go to a semi-
fancy restaurant pretending to be a sports bar. They want a fun place to hang out with their friends.

*Graph 16:* This is a graph to show the amount of transactions paid with each payment type. There are only a few payment types, but each type has a specific customer we have. Meal plan and BG1 card are primarily students. Catering/Department charges are faculty staff, and the majority of cash/credit card are adults.
8. Conclusion

There are many different conclusions I was able to draw from this project. The first conclusion comes from which day is the busiest. It really does depend on the semester to tell which day will be the busiest. Thursdays and Wednesdays tend to be busier, with the occasional Friday. There is really no way to predict it thus far, except that the Spring is always busier. The Spring is busier because students realize that they have left over meal plan (falcon dollars) and come in to purchase the higher priced items. There statistical tests prove this, as well was tables that clearly show higher sales and quantity in the Spring.

I was also able to show that some of the older items that have been taken off the menu are more popular then the items we have now. Granted, they may have been on the menu a semester longer, but some of the numbers are drastically larger than the numbers of our current menu items. Items such as the quesadilla, fettuccini, expresso cake, the chop-chop salad and the BLT should be reconsidered into a new menu. Current items such as the crispy crushed potatoes, andouille sausage, ginger beet float, tempura shrimp, ramen bowl as well as the curry chicken don’t seem to have high sales, so they should be in consideration to be taken off the menu.

I was also able to see that people tend to purchase more smaller items such as appetizers, sides and sandwiches verses the entrees. I found this interesting because I felt like students would buy more higher priced items to get rid of their falcon dollars, but that doesn’t seem to be the case. With this information, there should be more focus on the smaller items than the larger items.

I was also able to develop a marketing plan according to types of people that come in. It seems like students who use falcon dollars are most popular, and staff/faculty are lacking. In my plan, I thought we can try to see what the faculty want, and work on bringing them in by offering a special discount for using department charges or creating specials that will appeal to them. On the other hand, we don’t want to forget the students, so we need to get on social media more, create high energy emails to send out and see what they want to eat as well.

I believe I have found some interesting conclusions that can help the Pub in the future. I truly hope they take this information it into consideration. I believe the Pub is a great establishment, but it does need some improvement in marketing as well as menu items and bring back some popular items.
9. Honors Project Requirements

Goal of the Project:
The goal of the project was to prove that some of the older items at the Black Swamp pub were more popular than those there are now. I wanted to bring statistical proof to show that they may need to update the menu. I also wanted to help them become more successful with what I have learned through my 3 years in the Data Science program as well as what I learned in my Marketing class.

Original Scholarship:
There has been nothing done like this with the Black Swamp Pub. As far as I know, they have not used statistics into the creation of the menu.

Inquiry-Based Learning:
As I have gone along, I have gotten suggestions from multiple people. My two faculty advisors have been helpful in answering any questions I may have. My manager has also been helpful in giving me a direction when I didn’t have one. He has asked interesting questions that have made me think to look at the data again to give him an answer. I did all the code, which has showed how much I have actually learned.

Interdisciplinary:
Data science in itself is interdisciplinary. I used R code, mathematics, marketing, written as well as verbal communication.

Oral Communication:
I needed to be able to talk to people to get help, as well as do the final presentation at the end. This project helped me express my findings in a way everyone will understand.

Written Communication:
Just like oral communication, I needed to be able to write in a way that everyone understood. I also needed to communicate with the person I acquired the data from in what I wanted as well as being grateful for what she provided me with.

Integrative in Design:
I used statistical analysis to bring a different perspective to food service. I used real data from the Black Swamp Pub and was able to come up with different conclusions that will hopefully help in decision making in the future. They will now have a deeper understanding of what people actually want and will hopefully make steps to make the Pub more successful. I am hoping to do a continuation project to see if anything was adapted in the future.

Critical Thinking:
I created all the tests that are presented in this report. I needed to think about what I wanted to test and all possible factors that might go into it. The graphs don’t account for all the possibilities, so I needed to write down why I thought the results came out as they did.
Challenges:

The main challenge of this project was getting the data and putting it into a form I could work with. I got some of the data in forms that were hard to analyze it, so I needed to fix that. Another issue came with the code, the main one being formatting it in a way that is easier to read. I needed to google how to format a graph from largest to smallest.

Implications:

I am truly hoping that BGSU dining takes these suggestions to enhance the Pub and change it, so it is more successful. There has been talk of it not being successful and keeping it the same many not be the answer. We need to revamp it to bring in new customers and keep the old. Changing the menu is good but removing popular items may not be the way to go. Again, I am hoping to do a continuation of this project to see if anything changed and possibly suggest new things that could help.

Limitations:

I was only given so much data. This caused limitation because I could only do so much with what I had. I obviously wanted some more, but what I wanted was private. I am grateful with what I got, and I believe I came up with good conclusions, but If I had more information, I could have delved deeper into the background details we don’t know about.
10. References

Baird, Marie Thomas. *Dining at BGSU to see a shake-up this year*. 17 August 2017.

"Bistro offers good food in cozy setting." *Waterloo Region Record* (2017).

