Guided Capstone Project Report

(Big Mountain Price analysis)

From: Parul Rana
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Data source: Springboard (Guided capstone Project)

Introduction:

Big Mountain Resort, a ski resort located in Montana. Big Mountain Resort offers spectacular views of Glacier National Park and Flathead National Forest, with access to 105 trails. Every year about 350,000 people ski or snowboard at Big Mountain. This mountain can accommodate skiers and riders of all levels and abilities. These are serviced by 11 lifts, 2 T-bars, and 1 magic carpet for novice skiers. The longest run is named Hellfire and is 3.3 miles in length. The base elevation is 4,464 ft, and the summit is 6,817 ft with a vertical drop of 2,353 ft. Big Mountain Resort has recently installed an additional chair lift to help increase the distribution of visitors across the mountain. This additional chair increases their operating costs by $1,506,5471 this season. The business wants to select a better value for their ticket price. They are also considering a number of changes that they hope will either cut costs without undermining the ticket price or will support an even higher ticket price.

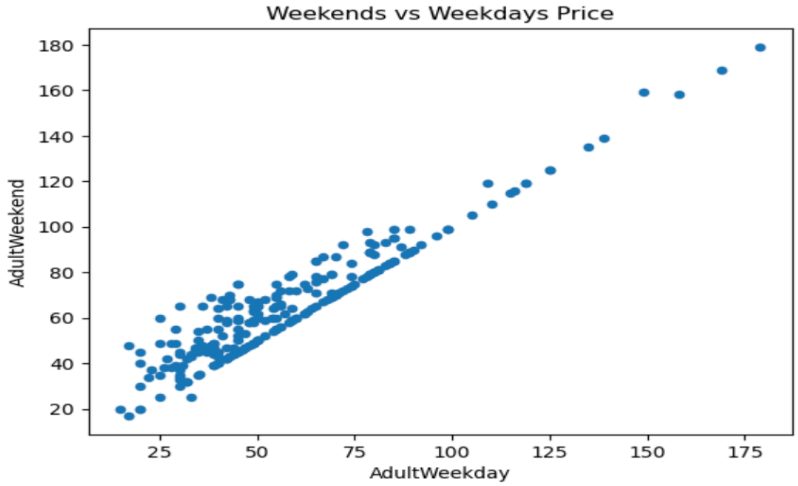
Problem:

Big Mountain Resort needs to rethink the new pricing strategy or implement a more data-driven business strategy by comparing prices with other states in USA. They need to develop a model to determine best ticket prices that will help increase revenue and profit.

Data Wrangling:

Provided dataset will be cleaned during this stage. There is duplicate data between regions and states that are causing discrepancies in the dataset. The available information provides important values like total number of runs, fastEight, snowMaking_ac, Ticket prices for adult weekends and weekdays. Ticket prices will be compared between states to see if there are any differences. It is important to understand what is driving differences in prices to improve revenue.

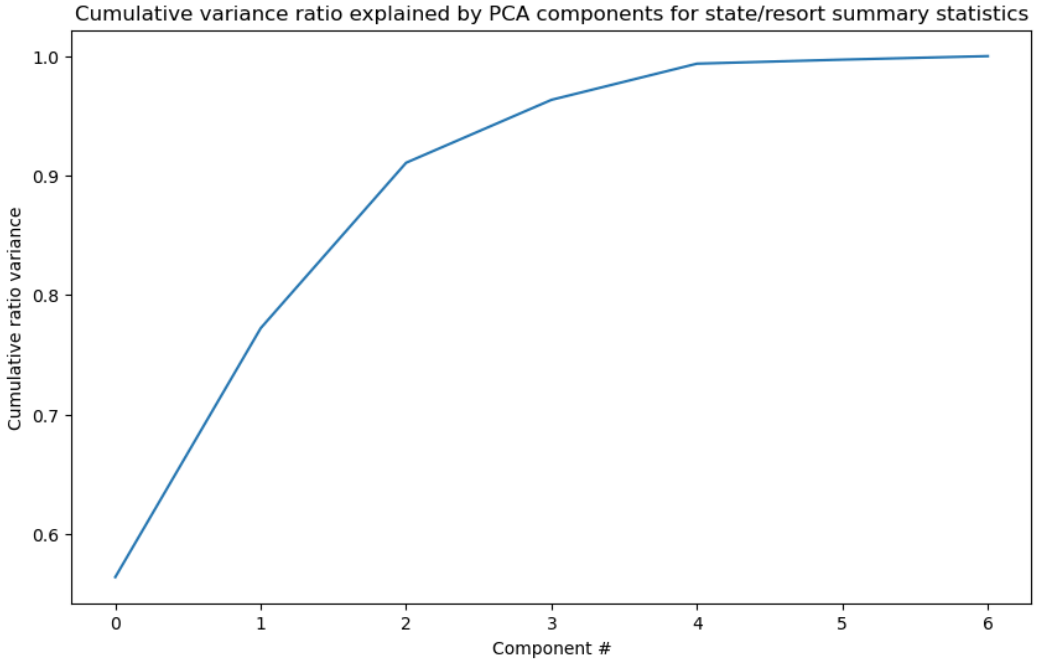
Most states have high-ticket prices on the weekends than weekdays as shown in above graph. But the data still has inconsistency as 16% of resorts have missing price values. After dropping missing data, the data plots as below:



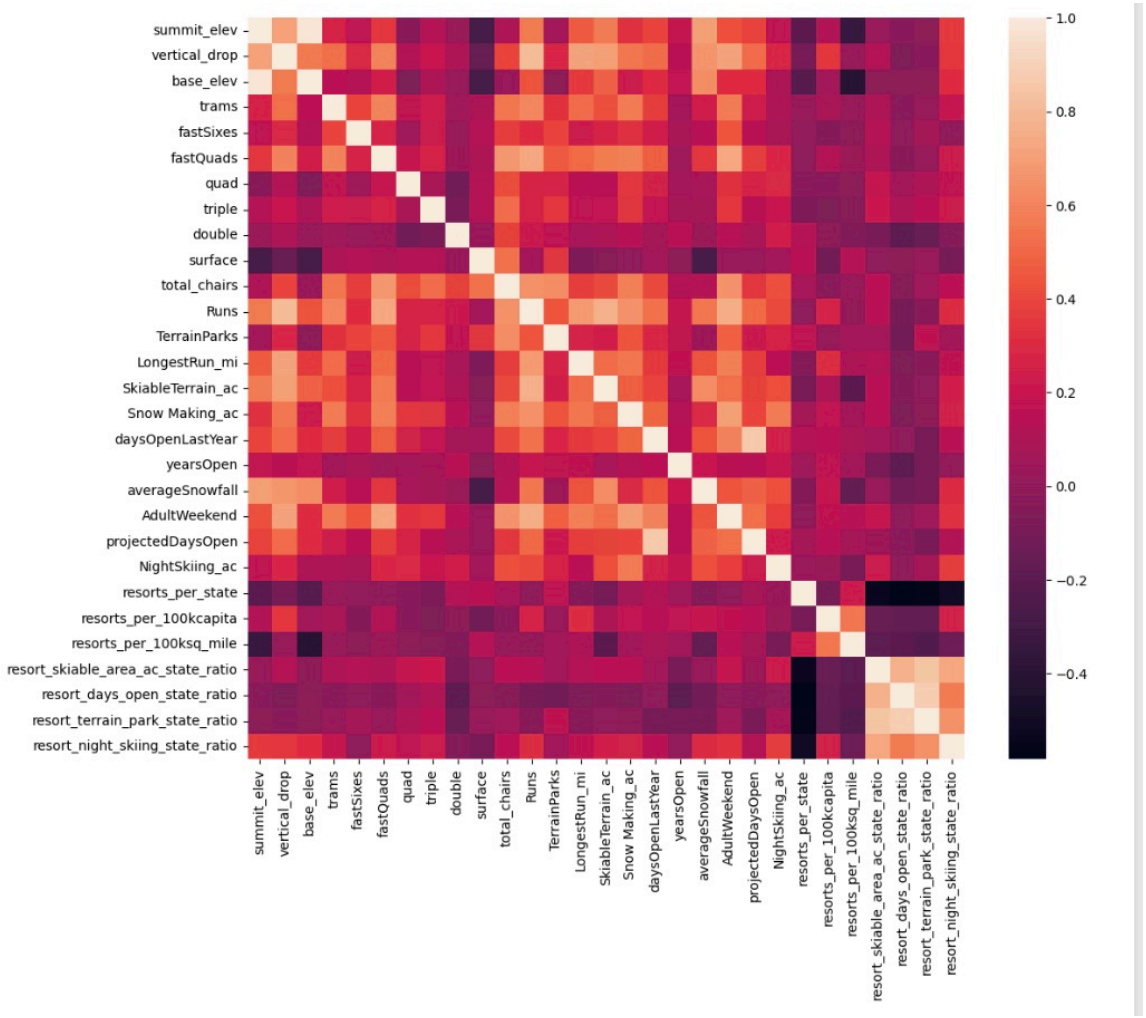
Most states have same prices for both weekdays and weekends. Big mountain resort data have several missing values for Adult weekdays and Adult weekends. Since weekdays have more missing values, the whole column can be dropped. We also have missing values in fastEight and half the values are zero, so it can also be dropped. The skiableTerrain_ac's value is also incorrect as it was showing 26819, and should be 1819. After dropping and replacing the irrelevant data, we have 277 rows and 25 columns left, which will further help, predict ticket prices for revenue growth.

Exploratory Data Analysis:

To further get an insight in provided dataset, the data need to be analyzed to find any trends and patterns. These trends and patterns can provide ideas on how business problems can be solved that are preventing revenue growth. First we compared population statistics between different states and found the targeted resort Big Mountain Ski Resort Montana comes 3rd in size among all states. Although, New York has most number of resorts and in addition have night skiing availability.



The next thing I wanted to look into is the relationship between components such as vertical drop, years open and skiable areas, versus the price in each state. This requires a Principal Cumulative Analysis (PCA), which showed that the first two components accounts for 75% of the variance and the first four accounts for 95%.

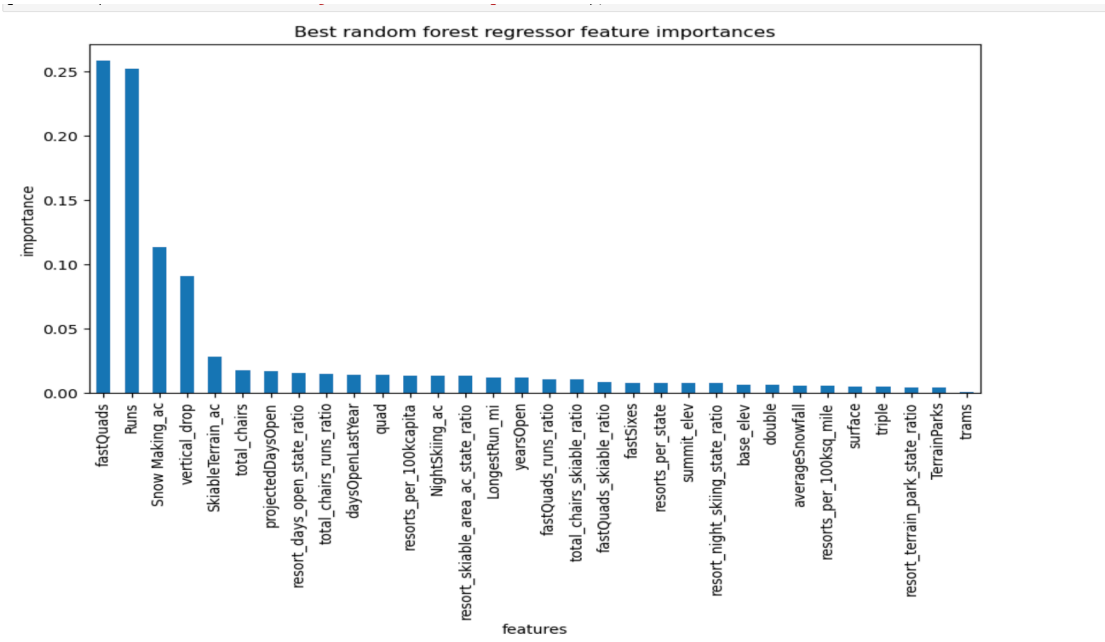


There are some interesting observations in this heatmap as it shows many positive correlations between each other, such as the ratios of night skiing areas with the number of resorts per capita. AdultWeekend ticket price has consistent correlations with all other catagories. FastQuads stands out along with Runs and SnowMaking_ac. Runs and Tota_chairs are quite well correlated with ticket price. The vertical drop seems to be a selling point that raises ticket prices as well. There's a strong positive correlation with vertical drop and fastQuads seems very useful also.
Runs and total_chairs appear quite similar and also useful resorts _per_100Kcapita It also appears that having no fast quads may limit the ticket price, but if your resort covers a wide area then getting a small number of fast quads may be beneficial to ticket price.

Pre-Processing:

After preliminary assessment we will now perform cross validation to gain future performance in dataset. To guess the average price we use the mean as a predictor and use median to fill the missing value. There is not much variation in the mean and median

for the dataset. But Mean Absolute Error is the most intuitive of all the metrics and provides average price, which is expected to be off by $19. So to assess the model performance the variance can be calculated by calculating linear regression, which showed 80% of the variance on the train set and 70% of variance in test set. Regression model was performed using median and found the absolute error is $9, which is better than $19. As I am getting close to improving ticket prices I have choose to do random Forest Model to go straight from defining the pipelines to assess the performance using cross validation.

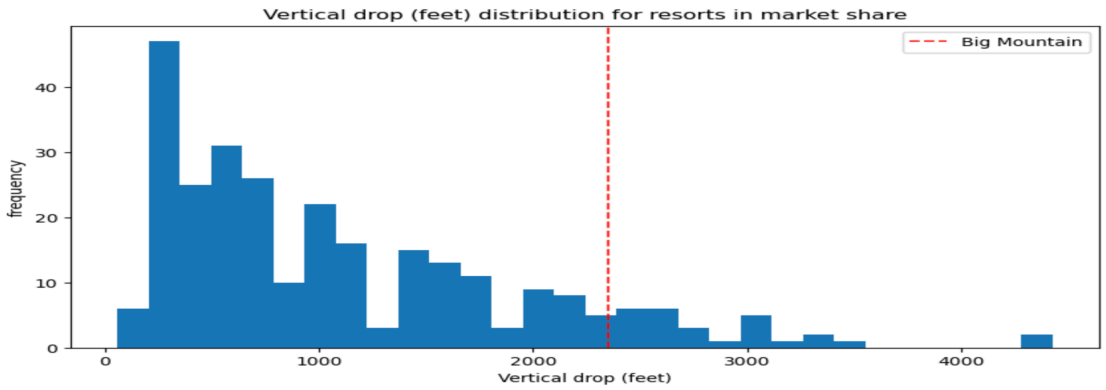


Using Random Forest Regression model help to identify imputting the median values, which helps with the mean absolute error of the components. Getting coefficient of linear regression we found out that vertical drop has biggest positive features. On the other hand, skiable terrain has negative association and fastQuads is constant with ticket prices. Random forest model also has a lower cross validation mean absolute error by almost $1, which exhibits less variability.

Modeling:

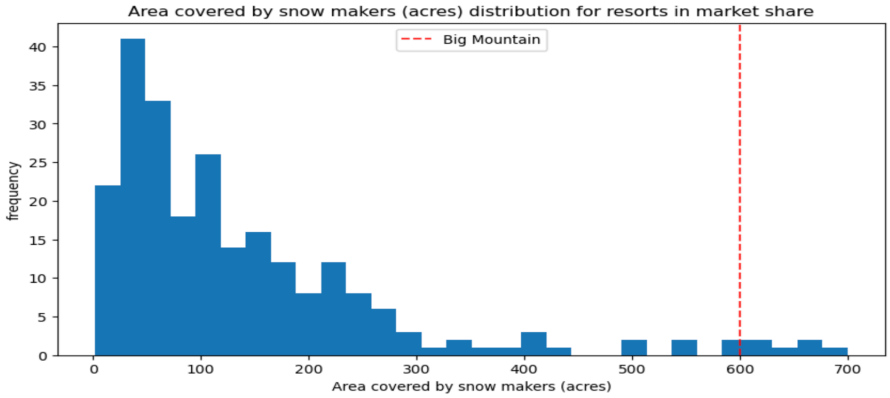
I have gain some insight with what ticket price Big Mountain's facilities might actually support as well explore the sensitivity of changes to various resort parameters. To build the model I use our top components (vertical_drop, Snow making_ac, total_cahirs, fastQuards,Runs, LongestRun_mi, Trams, Skiable_Terrain_ac, which helps me to identify what could be the possible parameter increase or deceasing the revenue compared to other resort.

Vertical drop



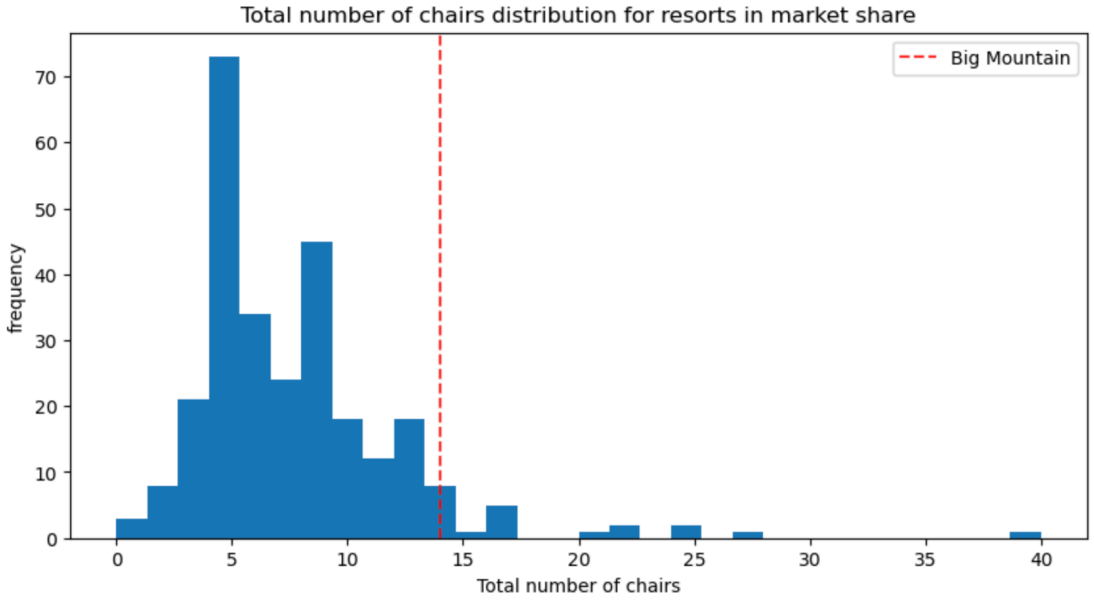
Big Mountain is doing well for vertical drop, but there are still quite a few resorts with a greater drop.

Snow makers



Big Mountain is very high up the league table of snow making area.

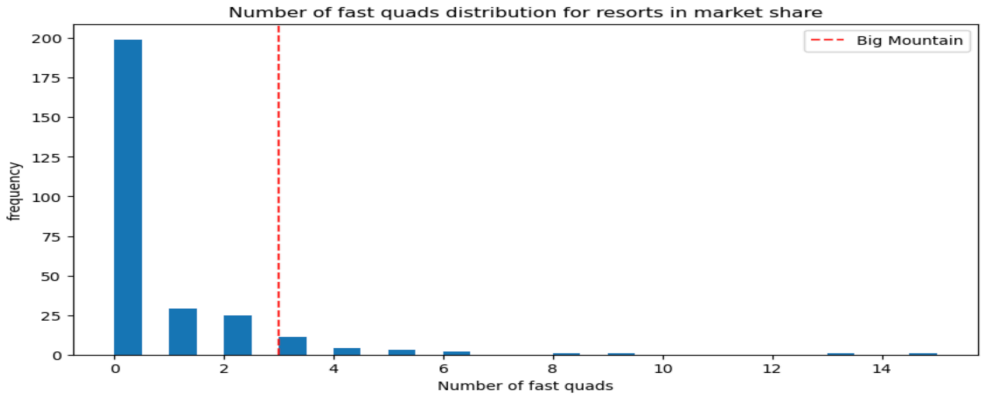
Total chairs:



Big Mountain has amongst the highest number of total chairs, resorts with more appear to be outliers.

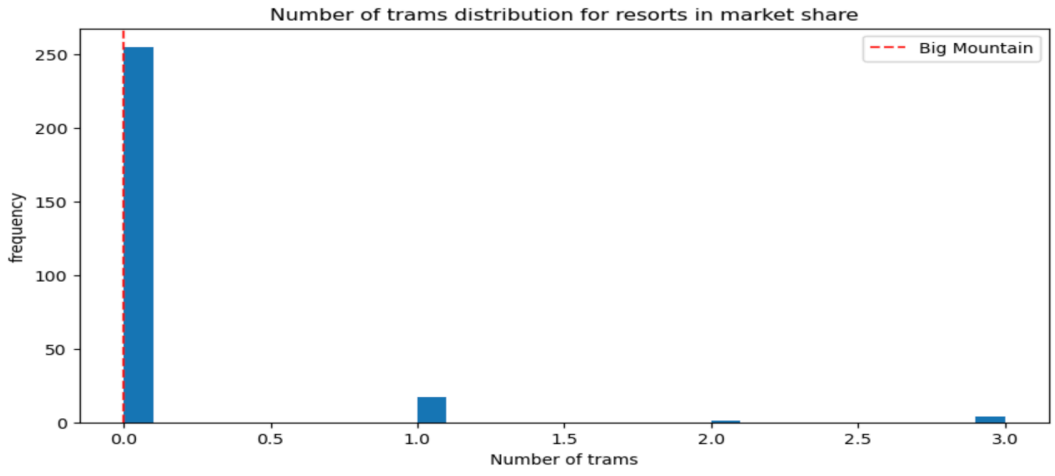
Skiable terrain area

fastQuads



Most resorts have no fast quads. Big Mountain has 3, which puts it high up that league table. There are some values much higher, but they are rare.

Trams



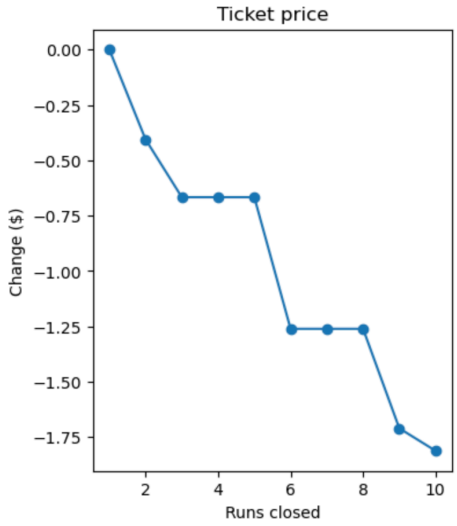
The vast majority of resorts, such as Big Mountain, have no trams.

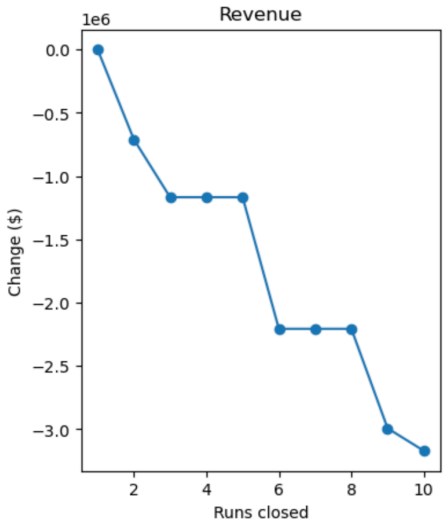
Big Mountain has ranked high or equal in every category compare to other resorts except Trams, which is not available at the resorts in other states. Changing trams parameter will not have a big impact on ticket prices and revenue growth. Comparing to

other resorts Big Mountain is a great facility that provides several services to customers and as per dataset they should get revenue. The initial price is $81.00 and the modeling price is $95.87, which is above the initial price.

Conclusion:

Big Mountain is providing great facilities but still struggling to have revenue growth. There is positive difference in initial and modeling prices, in addition to this we also has expected mean absolute error of $10.39, which means we can still increase price. By adding a vertical drop and by adding 2 acres of snowmaking area we can increase price by $ 9.90, which will help with slight growth in revenue.





Big Mountain gets around 350,000 visitors each year but they don't utilize all facilities. Closing down 4-5 runs may not have an impact on ticket prices but closing more will cause huge drop in revenue. Finally, looking at all the analysis and building model reveal that Big Mountain is providing a vast majority of services, which are also provided by other top most ski resorts. Although this dataset precisely good for analyzing the future ticket price for this resort, it will see improvement in future. There are other important findings in provided dataset that will be helpful for Big Mountain Resort to get continuous revenue growth in future.