**Abstract-**

The Walt Disney Company, commonly known as Disney, is an American diversified [multinational](https://en.wikipedia.org/wiki/Multinational_corporation) [mass media](https://en.wikipedia.org/wiki/Mass_media) and entertainment [c](https://en.wikipedia.org/wiki/Media_conglomerate)ompany. It is the world's second largest media firm in terms of revenue. Theme parks are core to the business model of this American media giant. Last year its 11 parks around the world provided nearly a third of its $45 billion revenue and 20.7% of its $10.7 billion operating profit. Therefore, it becomes imperative for the management to focus their concentration on the theme parks for its revenue production. How can this be done? The answer to this interrogation is explained in our project.

One of the main factors for generating revenue from the theme parks would be to track the footfall for the parks. This is indicative of the number of people visiting every year and thus the revenue earned. However, footfall is not the only factor that will generate the revenues from the theme parks. Therefore, our project aims at defining a correlation between the footfall and the net income of the theme parks.

We use this correlation to draw conclusions between the various aspects in which Disney can diversify their business and optimize their net income. The same is explained schematically using a P-diagram

**Methodology-**

We aim at predicting the footfall data for the theme parks and correlating it with the net income of the parks. This correlation is further used to draw conclusions to optimize the net income by providing business solutions. For implementing this we have collected data containing footfall and net income of the company for the past 18 years (1998 - 2015). The theme parks included are all 11 Disney theme parks across the world. The parameters for central tendency (mean and standard deviation) are calculated for the footfall for parks across the US. The footfall and net incomes of the entire theme park business was also evaluated.

Now for theme parks in Florida and California, we do the hypothesis testing for the footfall of 2015 and verify the value with the actual data. We will also be calculating prediction interval of the footfall for the next year that is 2016. The confidence interval of 95% is used to calculate the prediction intervals or the range of the values. We will also derive the prediction intervals for the following year. This project explains the use of various statistical tools learnt during this course along with the use of Microsoft Excel and Minitab 17. This data can be used to calculate the expected income and the allocation and utilization of the resources that will help optimize the profits. Further in the project we calculate the correlation between the overall footfall and the net income for all Disney theme parks around the world. Observing these details we can comment about the ways in which the theme park should use the available resources to increase their net profits. A confidence interval of 95% is considered for the hypothesis and prediction analysis.

**P Diagram -**

* Marketing
* New attractions
* Discounts
* Location

Control Factors

Net income

People Coming to Disneyland

Walt Disney Theme Parks & Resorts

* Bad weather
* Breakdowns
* Economic Conditions
* Competitors

Noise Factors

**Data:**

**Walt Disney Company's theme parks (footfall in million)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Years** | **CA** | **CA ADV** | **MK** | **Epcot** | **HS** | **AK** | **Typhoon** | **Blizzard** | **Tokyo DL** | **Tokyo DSEA** | **Paris** | **Paris WDP** | **HK** | **Total** |
| 1998 | 13.7 | 0 | 15.2 | 10.6 | 9.5 | 6 | 0 | 0 | 16.7 | 0 | 12.5 | 0 | 0 | 84.2 |
| 1999 | 13.5 | 0 | 15.4 | 10.1 | 8.7 | 8.6 | 0 | 0 | 17.5 | 0 | 12.5 | 0 | 0 | 86.3 |
| 2000 | 13.9 | 0 | 15.5 | 10.6 | 8.9 | 8.3 | 0 | 0 | 16.5 | 0 | 12 | 0 | 0 | 85.7 |
| 2001 | 12.3 | 5 | 14.7 | 9 | 8.3 | 7.7 | 1.7 | 1.8 | 17.7 | 4 | 12.2 | 0 | 0 | 94.4 |
| 2002 | 12.7 | 4.7 | 14 | 8.3 | 8 | 7.3 | 1.6 | 1.7 | 13 | 12 | 10.3 | 2.8 | 0 | 96.4 |
| 2003 | 12.7 | 5.3 | 14 | 8.6 | 7.9 | 7.3 | 1.7 | 1.6 | 13.2 | 12.2 | 10.2 | 2.2 | 0 | 96.9 |
| 2004 | 13.3 | 5.6 | 15.1 | 9.4 | 8.3 | 7.8 | 1.8 | 1.7 | 13.2 | 12.2 | 10.2 | 2.2 | 0 | 101 |
| 2005 | 14.5 | 5.8 | 16.1 | 9.9 | 8.6 | 8.2 | 1.9 | 1.8 | 13 | 12 | 10.2 | 2.1 | 0 | 104 |
| 2006 | 14.7 | 6.0 | 16.6 | 10.5 | 9.1 | 8.9 | 2.1 | 1.9 | 12.9 | 12.1 | 10.6 | 2.2 | 5.2 | 113 |
| 2007 | 14.9 | 5.7 | 17.1 | 10.9 | 9.5 | 9.5 | 2.1 | 1.9 | 13.9 | 12.4 | 12 | 2.5 | 4.2 | 117 |
| 2008 | 14.7 | 5.6 | 17.1 | 10.9 | 9.6 | 9.5 | 2.1 | 1.9 | 14.3 | 12.5 | 12.7 | 2.6 | 4.5 | 118 |
| 2009 | 15.9 | 6.1 | 17.2 | 11 | 9.7 | 9.6 | 2.1 | 1.9 | 13.6 | 12 | 12.7 | 2.7 | 4.6 | 119 |
| 2010 | 16.0 | 6.3 | 17 | 10.8 | 9.6 | 9.7 | 2 | 1.9 | 14.5 | 12.7 | 10.5 | 4.5 | 5.2 | 121 |
| 2011 | 16.1 | 6.3 | 17.1 | 10.8 | 9.7 | 9.8 | 2.1 | 2 | 14 | 11.9 | 11 | 4.7 | 9.5 | 125 |
| 2012 | 16.0 | 7.8 | 17.5 | 11.1 | 9.9 | 10 | 2.1 | 1.9 | 14.8 | 12.7 | 11.2 | 4.8 | 6.7 | 127 |
| 2013 | 16.2 | 8.5 | 18.6 | 11.2 | 10.1 | 10.2 | 2.1 | 2 | 17.2 | 14.1 | 10.4 | 4.5 | 7.4 | 133 |
| 2014 | 16.8 | 8.8 | 19.3 | 11.5 | 10.3 | 10.4 | 2.2 | 2 | 17.3 | 14.1 | 9.9 | 4.3 | 7.5 | 134 |
| 2015 | 18.3 | 9.4 | 20.5 | 11.8 | 10.8 | 10.9 | 2.3 | 2.1 | 16.6 | 13.6 | 10.4 | 4.4 | 6.8 | 138 |

Mean of total footfall = 110.7 million

Std. deviation of total footfall = 17.52 million

**California Parks Florida Parks**

CA – Disneyland MK – Magic Kingdom

CA ADV – California Adventure Epcot - EPCOT

**Tokyo Parks** HS – Disney’s Hollywood Studio

Tokyo DL – Tokyo Disneyland AK – Disney’s Animal Kingdom

Tokyo DSEA – Tokyo DisneySea Typhoon – Typhoon Lagoon

**Paris Parks** Blizzard – Blizzard Beach

Paris – Paris Disneyland

Paris WDP – Paris Walt Disney Studios

**Hong Kong Parks**

HK – Hong Kong Disneyland

**Walt Disney theme park yearly net Income**

|  |  |
| --- | --- |
| **Years** | **Net income ( in $ million)** |
| 1998 | 1446 |
| 1999 | 1620 |
| 2000 | 1586 |
| 2001 | 1169 |
| 2002 | 957 |
| 2003 | 1123 |
| 2004 | 1178 |
| 2005 | 1534 |
| 2006 | 1710 |
| 2007 | 1897 |
| 2008 | 1418 |
| 2009 | 1318 |
| 2010 | 1553 |
| 2011 | 1902 |
| 2012 | 2220 |
| 2013 | 2663 |
| 2014 | 3031 |
| 2015 | 3298 |

Mean of net income = $1756.83 million

Std. deviation of net income = $657.20 million

**Time Series Plot –**

The above time series plot is a graphical representation of the trends, patterns and behavior of footfall data over the years. It depicts the footfall data for two locations – California and Florida and the worldwide footfall of Disney Theme Parks. We notice that Disney theme parks have seen steady increase in footfall over the years.

**Box Plots –**



Box-plots are used for identifying outliers, and give important information like quartile data and position of mean with respect to the quartiles.

**Anderson-Darling Normality Test of footfall data at California Parks**



P-Value > α, therefore the data is normally distributed



**Anderson-Darling Normality Test of footfall data at Florida Parks**

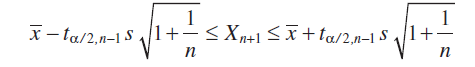


P-Value > α, therefore the data is normally distributed



**Hypothesis Testing of the Prediction of Footfall**

The prediction intervals for Florida and California’s footfall in 2015 are calculated using the following equation -



**Historical Data for Florida Parks Footfall**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Years** | **Magic Kingdom** | **EPCOT** | **Hollywood Studios** | **Animal Kingdom** | **Typhoon Lagoon Water Park** | **Blizzard Beach Water Park** | **Total Florida Footfall** |
| 1998 | 15.2 | 10.6 | 9.5 | 6 | 0 | 0 | 41.3 |
| 1999 | 15.4 | 10.1 | 8.7 | 8.6 | 0 | 0 | 42.8 |
| 2000 | 15.5 | 10.6 | 8.9 | 8.3 | 0 | 0 | 43.3 |
| 2001 | 14.7 | 9 | 8.3 | 7.7 | 1.7 | 1.8 | 43.2 |
| 2002 | 14 | 8.3 | 8 | 7.3 | 1.6 | 1.7 | 40.9 |
| 2003 | 14 | 8.6 | 7.9 | 7.3 | 1.7 | 1.6 | 41.1 |
| 2004 | 15.1 | 9.4 | 8.3 | 7.8 | 1.8 | 1.7 | 44.1 |
| 2005 | 16.1 | 9.9 | 8.6 | 8.2 | 1.9 | 1.8 | 46.5 |
| 2006 | 16.6 | 10.5 | 9.1 | 8.9 | 2.1 | 1.9 | 49.1 |
| 2007 | 17.1 | 10.9 | 9.5 | 9.5 | 2.1 | 1.9 | 51 |
| 2008 | 17.1 | 10.9 | 9.6 | 9.5 | 2.1 | 1.9 | 51.1 |
| 2009 | 17.2 | 11 | 9.7 | 9.6 | 2.1 | 1.9 | 51.5 |
| 2010 | 17 | 10.8 | 9.6 | 9.7 | 2 | 1.9 | 51 |
| 2011 | 17.1 | 10.8 | 9.7 | 9.8 | 2.1 | 2 | 51.5 |
| 2012 | 17.5 | 11.1 | 9.9 | 10 | 2.1 | 1.9 | 52.5 |
| 2013 | 18.6 | 11.2 | 10.1 | 10.2 | 2.1 | 2 | 54.2 |
| 2014 | 19.3 | 11.5 | 10.3 | 10.4 | 2.2 | 2 | 55.7 |
| 2015 | 20.5 | 11.8 | 10.8 | 10.9 | 2.3 | 2.1 | 58.4 |

We calculate the prediction intervals for the year 2015 using the above data, we get:

Now we verify our prediction interval using **hypothesis testing**.

For Florida,

Ho: µ= μ0 = 58.4 (In Million)

Ha: µ ≠ μ0

Confidence interval (95%)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | N | Mean | Std. dev. | 95% CI | Tα/2, n-1 |
| Florida | 17 | 47.694 | 5.014 | (36.76,58.63) | 2.110 |

We calculate the t0 and find,

t0 = 2.075

Therefore, accept the null hypothesis.

**Historical Data for California Parks Footfall**

|  |  |  |  |
| --- | --- | --- | --- |
| **Years** | **Disneyland** | **California Adventure** | **Total** |
| 1998 | 13.7 | 0 | 13.7 |
| 1999 | 13.5 | 0 | 13.5 |
| 2000 | 13.9 | 0 | 13.9 |
| 2001 | 12.3 | 5 | 17.3 |
| 2002 | 12.7 | 4.7 | 17.4 |
| 2003 | 12.7 | 5.3 | 18 |
| 2004 | 13.3 | 5.6 | 18.9 |
| 2005 | 14.5 | 5.8 | 20.3 |
| 2006 | 14.7 | 6 | 20.7 |
| 2007 | 14.9 | 5.7 | 20.6 |
| 2008 | 14.7 | 5.6 | 20.3 |
| 2009 | 15.9 | 6.1 | 22 |
| 2010 | 16 | 6.3 | 22.3 |
| 2011 | 16.1 | 6.3 | 22.4 |
| 2012 | 16 | 7.8 | 23.8 |
| 2013 | 16.2 | 8.5 | 24.7 |
| 2014 | 16.8 | 8.8 | 25.6 |
| 2015 | 18.3 | 9.4 | 27.7 |

For California, 2015

Now we verify our prediction interval using **hypothesis testing**.

For California,

H0: μ0 = 27.7 (In Million)

Ha: μ0 ≠ 27.7

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | N | Mean | Std. dev | 95% CI | Tα/2, n-1 |
| California | 17 | 19.729 | 3.717 | (11.61,27.89) | 2.110 |

We calculate the t0 and find,

t0 = 2.084

Therefore, we accept the null hypothesis.

It can be seen that the predictions for 2015 are consistent with the available data. Therefore, we can safely say that our predictions for 2016’s footfall will have a good accuracy.

The predictions for 2016’s footfall are given below –

Florida

California

**Correlation between Footfall data and Net Income**

|  |  |  |
| --- | --- | --- |
| **Years** | **Net income ( in $ million)** | **Total footfall** |
| 1998 | 1446 | 84.2 |
| 1999 | 1620 | 86.3 |
| 2000 | 1586 | 85.7 |
| 2001 | 1169 | 94.4 |
| 2002 | 957 | 96.4 |
| 2003 | 1123 | 96.9 |
| 2004 | 1178 | 101 |
| 2005 | 1534 | 104 |
| 2006 | 1710 | 113 |
| 2007 | 1897 | 117 |
| 2008 | 1418 | 118 |
| 2009 | 1318 | 119 |
| 2010 | 1553 | 121 |
| 2011 | 1902 | 125 |
| 2012 | 2220 | 127 |
| 2013 | 2663 | 133 |
| 2014 | 3031 | 134 |
| 2015 | 3298 | 138 |

The critical element of any business decision is its financial aspect. Having calculated the prediction intervals of footfall data for the years 2015 and 2016, we need to understand the significance of this footfall data. For this purpose we found the correlation between footfall data and net income of theme park business of Walt Disney Company. This indicates how income and footfall are related and thus help business to focus over the primary income generating factors. The correlation between the two is found to be 74.80%.

**Conclusions**

1. The footfall future predictions will help you plan the business policies and allocation of resources.
2. 74.8% correlation between footfall data and net income implies that the net income will increase with increase in footfall. So the company’s strategy should be to attract more customers.
3. The net income is correlated with footfall by a factor of 0.748, which means not all sources of income depend on the footfall alone. Few other sources like annual fees from lease contracts, parking lots, food joints, annual passes, etc. contribute to the revenue independent of the footfall.
4. The revenue for the business of theme parks and resorts is strongly correlated to the number of people visiting. But, as we see here, the correlation between footfall and net income is only moderately strong.

Revenue – Expenditure = Net Income

From the above equation we can say, the Net Income is adversely affected by the expenditure per footfall. In other words, the expenses per footfall are not in proportion with the revenue per footfall. The business strategy should especially concentrate on reducing the expenditure per footfall and in turn increase the net income.

**Suggestions**

The expenses per footfall for Walt Disney can be reduced by attracting customers to avenues of income where the annual costs are less as compared to other sources of income. For example, customers should be more attracted to resorts, where the annual Operations and Maintenance costs are fairly marginal and constant as compared to that of amusement parks.