Virtual Queue Implementation to Reduce Waiting Time at Theme Park Attraction Rides to Increase Revenue

Author: Mirnalyn Castro Lozada
Advisor: Dr. Rafael A. Nieves Castro
Industrial and Systems Engineering Department Polytechnic University of Puerto Rico

Abstract

Several times individuals visit with their family amusement parks and they spent 45 minutes to 3 hours of waiting per attraction. Since the amusement parks implemented seasonal attractions such as the Halloween horror nights to increase the visits from patron which extend waiting times all year round. To address this problem Kanban methodology techniques can be implemented to achieve customer satisfaction. This can be achieved by considering the customer as a material and the task would be to plan for Y amount of material to be processed in less time throughout the entire park for which virtual queues come in place. The methodology was implemented and tested before & after the SARS-Covid-19 restrictions were lifted during holidays which is the high demand. During the implementation and testing period of the Waiting Time Reduction at Theme Parks Methodology it was observed a positive impact of the Beta Test.

Introduction

The amusement parks used to be a summer and Christmas entertainment for the families, however, several amusement parks have implemented seasonal attractions such as the Halloween horror nights, or Food and wine fest amongst others to increase the visits from patrons. This research intends to analyze how to optimize the operations and resources of amusement theme parks by implementing techniques commonly used for manufacturing purposes. As consequence is expected that the workload per attraction would be reduced, leaving room to use the available resources to ensure customer satisfaction by achieving operational efficiency. Also, the implementation of this design project would increase the profits by preserving the actual cash input from the customer such as the park admission cost while is increased the sales from neglected areas such as retail and dining. Customer Expectation V. This have led to an increased number of academic studies that evaluate the experience related to theme or amusement parks.

Background

- The concept of quality of service implies that there is a gap between the expectations of customers vis-à-vis a form of service and their perceptions of the service ultimately received.[1]

- Overcrowding is a common experience in theme parks, a major factor of tourist dissatisfaction and a major determinant of their intention to frequent. [2]

- "Disneyland is recognized as a model of modern theme parks, and the exploitation and application of IP commercial value have become an essential means for Disney to expand its influence continuously."[3]

- "The goal of a theme park is to attract as many visitors as possible, however, it has been reported that crowdedness can deter more people from visiting the park." [4]

Problem

Amusement parks were once summer and Christmas entertainment for families, however, several amusement parks have seasonal attractions such as Halloween nights or party of gastronomy and among others, to increase customer visits. This practice has shown a positive increase in the number of customers throughout the year which is making the rides waiting times increase causing a downfall since this makes a decrease on the consumption of the goods. This research aims to analyze how optimize the resource operations of amusement parks by implementing techniques commonly used for manufacturing purposes. The importance of this is that with the implementation of Lean techniques, these bottlenecks would be reduced. The expectation of this research is to increase customer satisfaction and profits.

Methodology

The main goal of this research is to assess existent operational and customer satisfaction data from theme or amusement parks in order of determining their operational bottlenecks [1]. By determining those operational bottlenecks, process improvements techniques were be implemented. Consequently, this resulted in customer satisfaction increase and more profitability. If this technique is observed from a standing point of a theme park environment, then it can be X attraction or ride limiting the capacity of the customer enjoying other ones due to a time constraint caused by X attraction. For instance, it can be used actual data from Disney Animal Kingdom as shown in figure below.

**Ride Waiting Time vs Ride Duration Time**

In order to solve this situation, the use of coordination and available resources was implemented to decrease the time that the customer invest on the attractions. Kanban methodology techniques were implemented to achieve customer satisfaction for instance, if the customer is considered as a material and the task would be to plan for Y amount of material to be processed in less time throughout the entire park. Meaning, by scheduling the customer and planning ahead of time it can be stablished the itinerary to be run [2][3]. An assessment of attractions duration and capacity per hour should was made in order to optimize the workflow by setting up different time schedules per attraction eliminating waiting times.

Results and Discussion

The initial data was collected during the week that the methodology was implemented, and it was considered as low season due to park limitations due to the pandemic which led to lack of customers and low demand. Afterwards, it was measured and compared the functionality of the methodology after the SARS-Covid-19 restrictions were lifted during holidays which is the high demand. The highest demand holiday until the present was Labor Day weekend 2021 for which even when the admission to the park was closed by 11 am the functionality and waiting times decreased compared to a low season Figures 2-4. Waiting times average from a sample size N= 2000 per day.
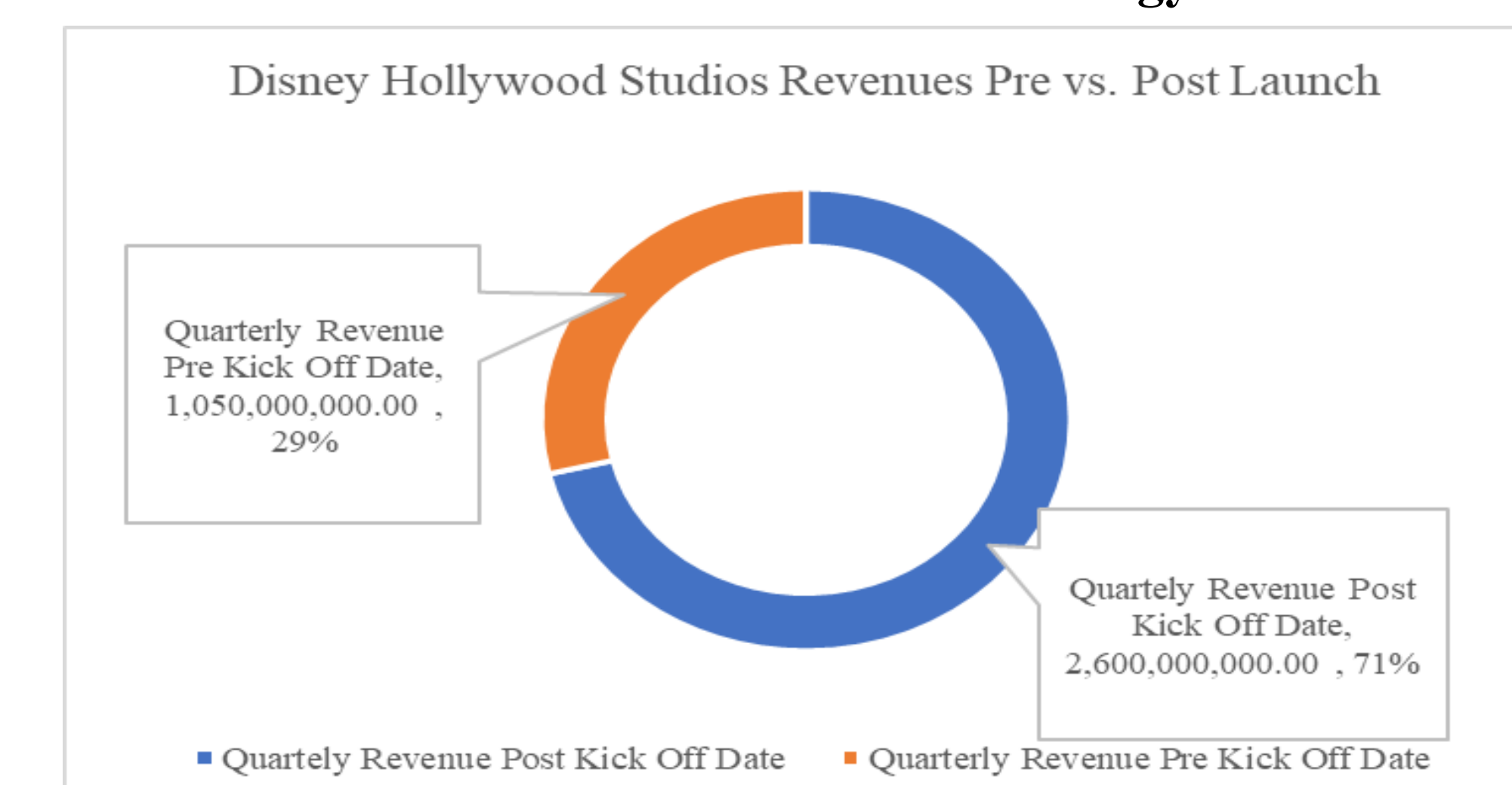
Waiting Time after Methodology Implementation
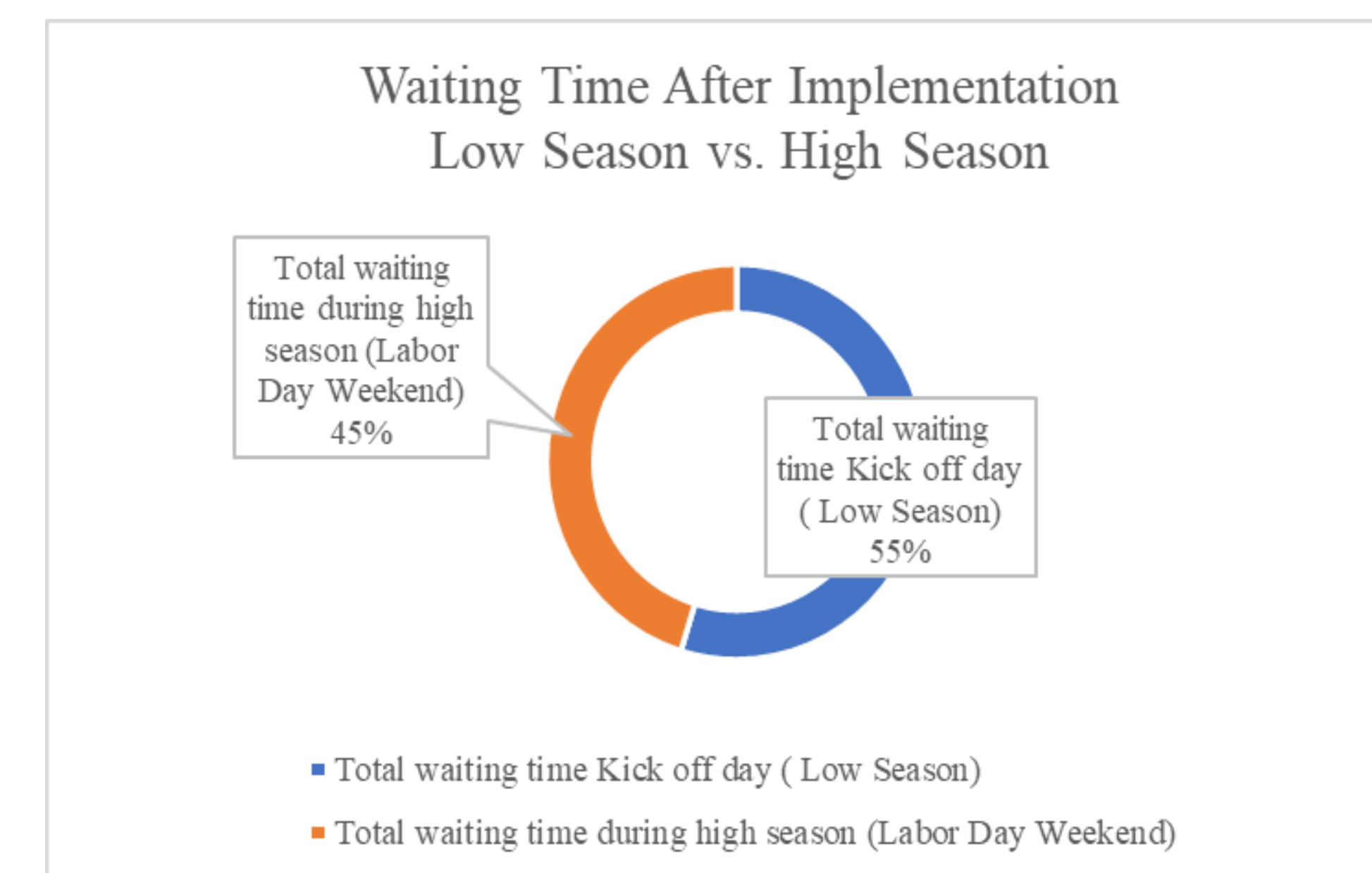
Company Size Growth after Methodology Implementation
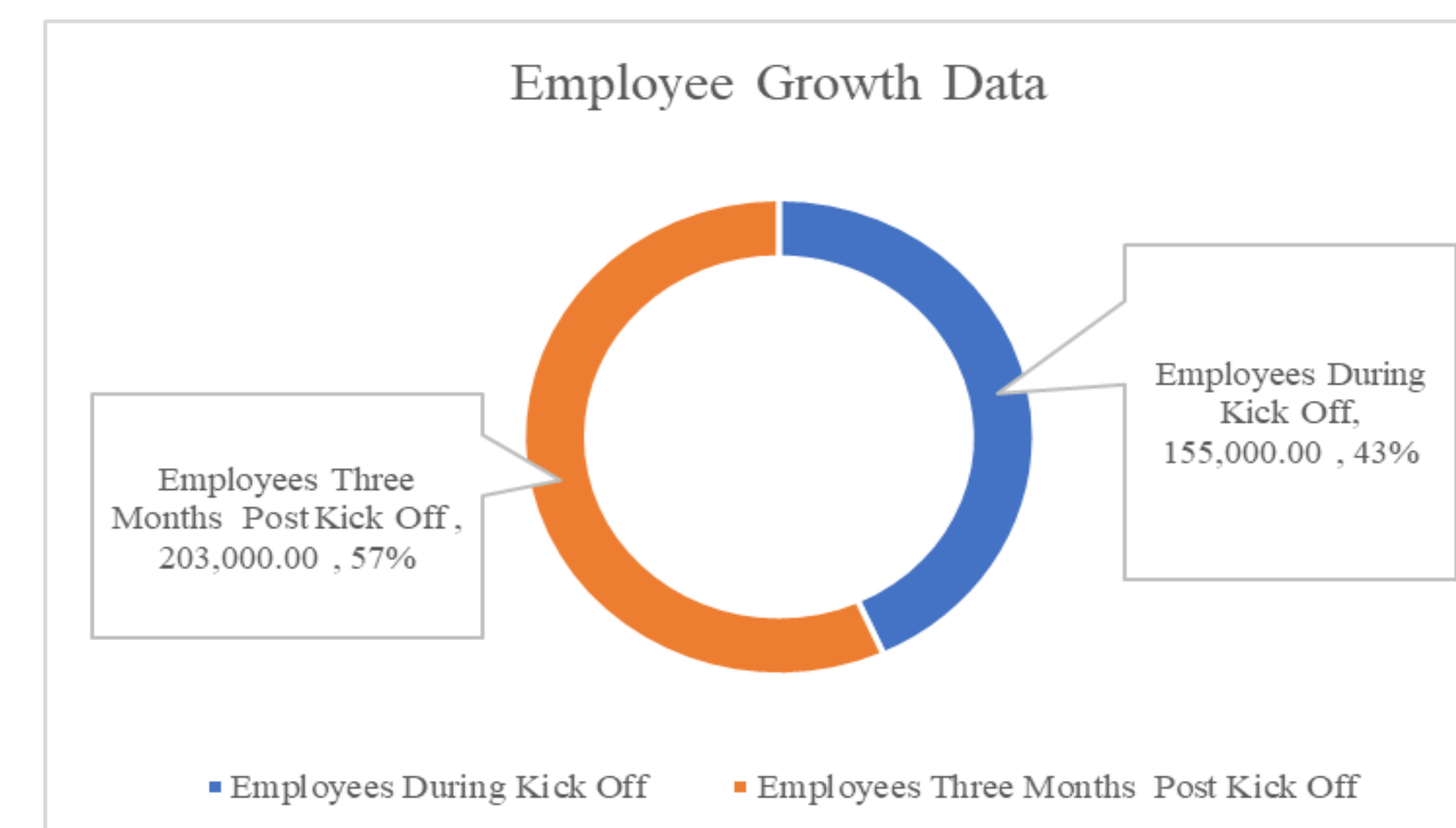
Revenue Data Pre vs. Post Methodology Launch

Conclusions

With the implementation of the methodology in one attraction only it was observed a reduction of waiting time on attractions of five percent, a company growth of fourteen percent and a revenue increase of forty two percent. Also, during the Customer Satisfaction Survey was observed sixty four percent of customer satisfaction with the reservation tool and 100% recommendations to friends and family members. One of the main challenges during the initial data collection after implementation was that the proposed methodology was launched amidst pandemic SARS-Covid-19 for which the collected values might differ during a regular type of scenario similar to pre-Covid-19 times. On the same path one of the largest difficulties encountered throughout this project was the data disclosure approval from Disney, Aerotek and third-party contractors.

Future Work

- Implementing the "Ride Reservation Methodology" throughout the entire Disney Hollywood Studio Theme Park.
- Test the effects of this implementation for a period of eight fiscal quarters or two years.
- Once the reservation methodology is properly tested implement it throughout the rest of the parks.

Acknowledgements

References

[1]   C.-S. Chan, Y. Liu, and C. Yeung Li, "Expectation- perception evaluation of theme park service quality in Zhengzhou Fantawild, China," Journal of Park and Recreation Administration, vol. 37, no. 2, pp. 99-117, Summer 2019, https://doi.org/10.18666/JPRA-2019-9157.
[2]   Y. Yuan and W. Zheng, "How to mitigate theme park crowding? A prospective coordination approach," Mathematical Problems in Engineering, vol. 2018, pp. 1- 11, Apr. 2018, https://doi.org/10.1155/2018/3138696.
[3]   Z. Xin and Y. Pan, "AR interaction design mode of multi- user and multi-character in theme parks," Journal of the Ergonomics Society of Korea, vol. 38, no. 6, pp. 457-469, Dec. 2019, DOI: 10.5143/JESK.2019.38.6.457.
[4]   C. Kim and S. Kim, "Measuring the operational efficiency of individual theme park attractions," SpringerPlus, vol. 5, no. 834, Jun. 2016, https://doi.org/10.1186/s40064-016- 2530-9.