

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

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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.*

Key Terms — *Enhancing customer experience on theme parks, theme parks waiting time, time reduction at theme parks, virtual queue.*

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. What my research will develop is an analysis of the current and existent data of those amusement parks. The expectation of

this research is to increase customer satisfaction and profits.

The implementation of this design project would provide a large contribution to the industry of amusement theme parks by decreasing the waiting time that the regular customer invests in each attraction. 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.

Physical facilities and the quality of the provided service are characteristics of the amusement parks that motivates visitors to visit theme parks, the quality of a service have the capacity of connecting particularly with the euphoric performance and influences the perception of the leisure experiences of visitors. The main goal of every amusement park is to appeal as many visitors as possible, however, this goal can lead to over-crowdedness which can deter of prevent more people from visiting those parks.

The SERVQUAL structure has been broadly functional to inspect service provisions and the quality management of amusement parks. Given the characteristic thematic and creative service environment of amusements parks, and the relatively enduring experiences of services, the expectation aspect of the customer is an important consideration.[1] The SERVQUAL structure is an

appropriate tool to study the service quality in theme parks.[2] The SERVQUAL model and the gap methodology, nevertheless, have yet to be applied and adapted to theme park settings.

Based on the initial SERVQUAL model proposed, this research implements most of the suggested dimensions with significant modifications to adapt in a Chinese framework.[3]

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. By determining those operational bottlenecks, process improvements techniques can be implemented. Consequently, this would result in customer satisfaction increase and more profitability.

Normally, when the term bottleneck is employed in a production facility is referred to an activity that limits the capacity of an entire system. 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.[4] For instance, it can be used actual data from Disney Animal Kingdom. Figure 1 shows that the ride Flight of Passage have a waiting time around 180 minutes, with the highest waiting time, while the triceratops spin only has an 8-minute wait time.

The reason for that is that one of the attractions is currently in more demand than the other. But that doesn't mean that is more important than the other is just that since is in more demand the customer would be more invested in spending 180 minutes on the currently popular attraction than 8 minutes in a regular one. As a consequence, the customer ends dissatisfied due to the fact that 180 minutes were invested, leaving less time to enjoy other activities. In order to solve this situation, the use of coordination and available resources needs to be implemented to decrease the time that the customer invest on the attractions shown on Figure 1.[5]

To address this problem Kanban methodology techniques can be implemented to achieve customer satisfaction. The way that this methodology can be employed is 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 established the itinerary to be run. In order to achieve that, an assessment of attractions duration and capacity per hour should be made in order to optimize the workflow by setting up different time schedules per attraction eliminating waiting times. For example, if an attraction has a capacity of 1600 customers per hour, then schedules of 400 customers every 15 minutes should be made with the goal of converting a 180 minutes waiting time into just 15 minutes. That way if the customer is aware of the time that they should be spending on each attraction they can plan for that spare time to enjoy other activities such as dining or shopping which would increase the profits. Another advantage as consequence of this reduction is that it would not be needed the amount of the square footage that is actually employed per attraction since is not needed the actual waiting area for which the space could be repurpose on attractions or activities to increase the customer experience and business profits.[6]

This proposal supports the establish problem statement by having a clear introduction, literature review and methodology. Is important to note that there are no gaps on the exposed arguments, hence, there is no need to fill the proposal with information or additional research since all the points had been properly supported. Since it was evaluated potential gaps, also, were evaluated potential irrelevant information during the literature review. There weren't findings of unnecessary information during the literature review. This proposal has supported opinions, hence, there are not unsubstantiated statements.

In the writing techniques employed during this proposal, there was a sentence variety in order to avoid redundancies short and long, complex and



Figure 1
Ride Waiting Time vs Ride Duration Time

declarative sentences were used. Of course, those writing techniques included the avoidance of wordiness or non-necessary phrases. Starting from the selection of the research topic for this proposal through the methodology, this research proposal contains concrete examples and key terms.

During the writing process of this research proposal all the efforts were made to develop sentences in a gracefully and cohesive way. The first-person use, colloquial language, slang, jargon or any type of dialect was avoided.

RESULTS

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 Table 1, Figure 1. Waiting times average from a sample size N= 2000 per day. Each attraction was measured at 10 am which is the park opening time, 1 pm which is the park rush time, and 3 pm after park rush time. The schedule and coordination methodology were implemented on the attraction Star Wars Rise of Resistance and then compared to the rest of the attraction on both testing period of time. After the 2,000 samples were collected per each test the invested time was calculated by using the average equation denoted as:

$$A = \frac{X_1 + X_2 + X_3 + \dots + X_n}{n} \quad (1)$$

For the time slot of 10 am Table 1 it can be seen that the average waiting time for Star Wars Rise of Resistance which is referred as the Beta Test is of zero minutes during low season and 5 minutes during high season.

After determining the average revenue per customer attendance to the park it was observed a 42 percent revenue growth Figure 2.

Table 1
Waiting Times Average from a Sample Size N=2000 per Day

Attractions waiting times 10 AM	Kick off date (Nov. 3rd-9th, 2021) Time (minutes)	Labor Day 2021 (Sept. 3rd - 6th, 2021) Time (minutes)
Lightning McQueen's Racing Academy	0	15
Alien Swirling Saucers	5	5
Muppet Vision 3D	10	10
Star Wars Rise of Resistance	0	5
Millennium Falcon: Smugglers Run	15	25
Star Tours – The Adventures Continue	12	5
Toy Story Mania	20	40
Twilight Zone Tower of Terror	35	30
Rock 'n' Roller Coaster featuring Aerosmith	45	35
Slinky Dog Dash	80	60
Mickey and Minnie's Runaway Railway ⁸	105	90
Attractions waiting times at 1 PM		
Lightning McQueen's Racing Academy	0	15
Alien Swirling Saucers	20	15
Muppet Vision 3D	50	35
Star Wars Rise of Resistance	5	5
Millennium Falcon: Smugglers Run	65	55
Star Tours – The Adventures Continue	35	15
Toy Story Mania	25	30
Twilight Zone Tower of Terror	45	45
Rock 'n' Roller Coaster featuring Aerosmith	45	40
Slinky Dog Dash	75	55
Mickey and Minnie's Runaway Railway	85	80
Attractions waiting times at 3 PM		
Lightning McQueen's Racing Academy	15	20
Alien Swirling Saucers	25	10
Muppet Vision 3D	15	10
Star Wars Rise of Resistance	5	5
Millennium Falcon: Smugglers Run	55	25
Star Tours – The Adventures Continue	15	10
Toy Story Mania	30	10
Twilight Zone Tower of Terror	40	40
Rock 'n' Roller Coaster featuring Aerosmith	45	30
Slinky Dog Dash	60	30
Mickey and Minnie's Runaway Railway	85	65
Total time measured for 2000 individuals	1167	965

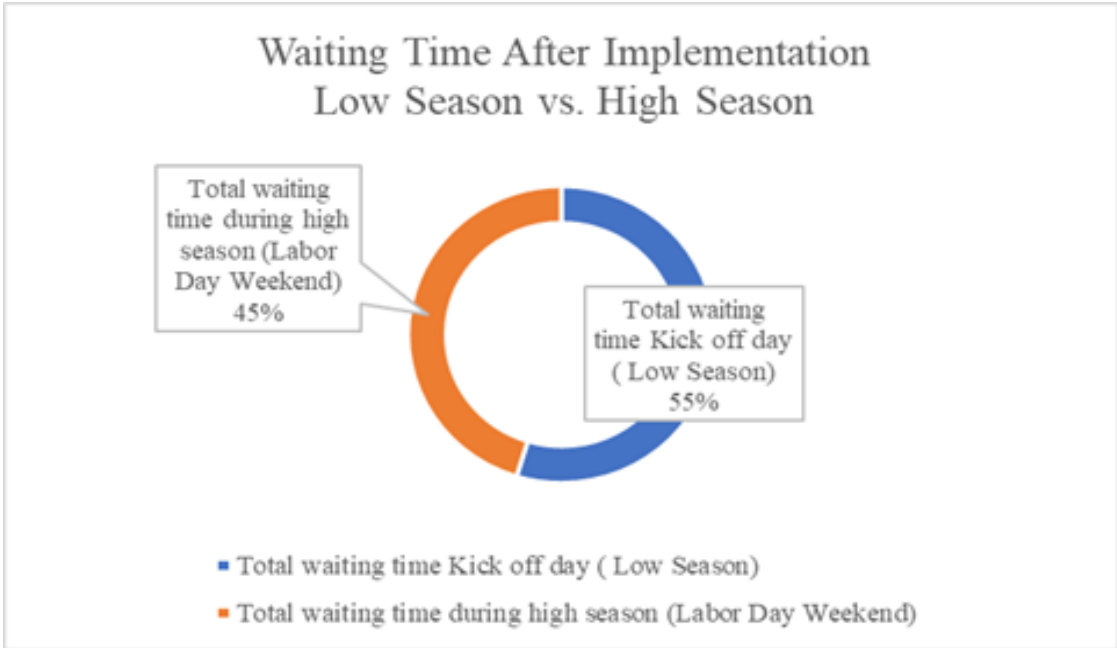


Figure 2
Waiting Time after Methodology Implementation

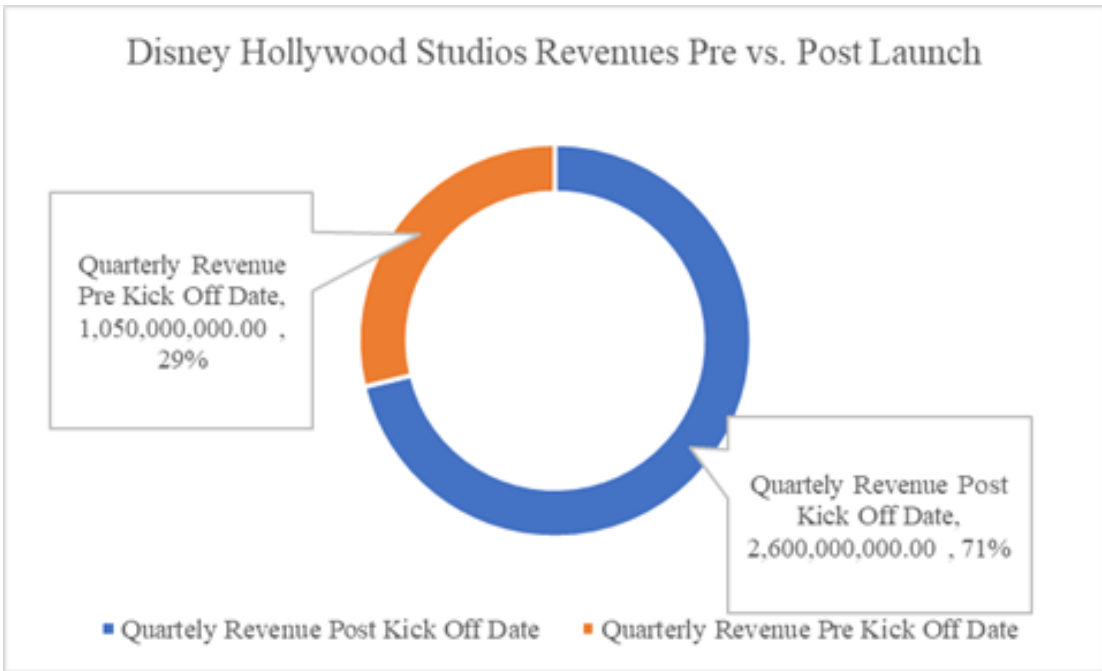


Figure 3
Revenue Data Pre VS Post Methodology Launch

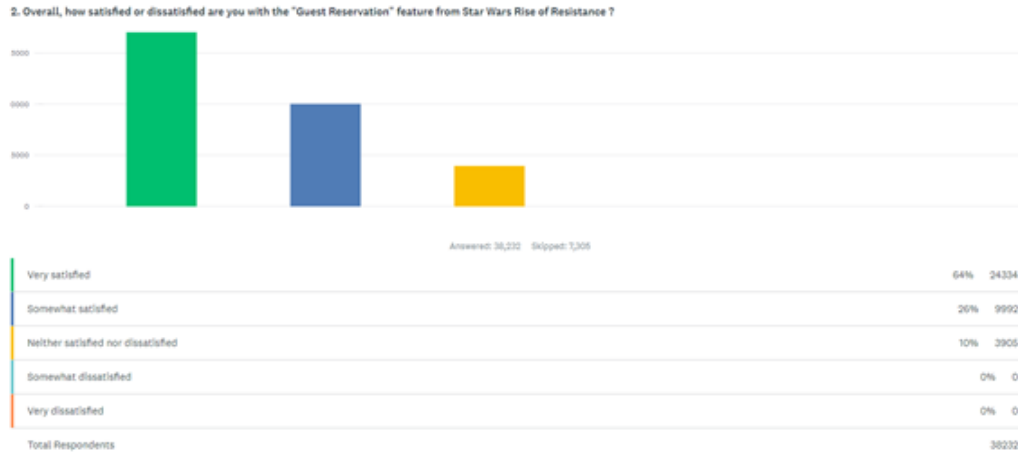


Figure 4
Guest Reservation. Customer Satisfaction Question # 2

In terms of customer satisfaction, a short customer satisfaction survey was made in order to establish the efficacy of the "Ride Reservation Method" [7]. 100% of the customers that answered the question would recommend the attraction to a family or member Figure 3. 64 % felt satisfied with the guest reservation feature, 20% felt somewhat satisfied and 20% felt neither satisfied nor dissatisfied. Figure 4. 6 show how 10 percent of the customer consider the reservation tool unique, 29 percent find the reservation useful, 34 % considers that this is a high-quality feature, and 37% considers that the reservations are reliable.

During low season the parks had an average attendance of 20,000 individuals per day versus the high season that had an attendance of the maximum cap 50,000 individuals each day. Is significant the improvement that a single Beta Test has caused on the park, the employment rate increase from 155,000 employees to 203,000 which is a growth of 14 percent and the maximum employment rate on this park to the present.

CONCLUSION

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 (Star Wars Rise of Resistance). 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.

The objectives of this design project have been met by collecting operational and assessing operational data of amusement theme parks facilities. A design methodology was designed and implemented, and it was proved an increment of resources efficiency. Customer satisfactions techniques were implemented, the estimated 20% waiting time reduction was not achieved due to corporate limitations and SARS-Covid-19 restrictions. Is projected up to a 50% after returning to normalcy post pandemic.

Based on the positive progress that could be observed from the data collection process the next

step would be to implement the “Ride Reservation Methodology” throughout the entire Disney Hollywood Studio Theme Park and test the effects of this implementation for a period of eight fiscal quarters or two years. Once the reservation methodology is properly tested then for that period of time additional implementations would be performed throughout the rest of the parks.

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