**Background Reading**

**Measuring the operational efficiency of individual theme park attractions**<https://springerplus.springeropen.com/articles/10.1186/s40064-016-2530-9>

This study aimed to analyze the efficiency of individual attractions at Samsung Everland theme park in terms of waiting time and customer satisfaction. The study used data envelopment analysis (DEA) to assess the operational efficiency of the attractions based on input factors such as installation cost, installation area, and annual repair cost, and output factors such as annual user and customer satisfaction. The findings indicated that waiting time is a critical factor in customers' decision-making process and that roller coaster-type attractions had higher installation and repair costs but lower efficiency than rotating-type attractions. However, roller coaster-type attractions also had a higher brand effect, leading to increased revisit intention from customers. The study then provides insights into future theme parks' attraction configuration and efficiency management.

*PURPOSE OF STUDY*

* Analyse the efficiency of individual attractions in terms of waiting time.

*METHOD OF STUDY*

* The operational efficiency of the attractions was analyzed using data envelopment analysis (DEA) using the installation area, the installation cost, and the annual repair cost of the attraction as input factors and the number of annual users and customer satisfaction as output factors.
* Customer satisfaction survey results for individual attractions at Samsung Everland were used in conjunction with the operational efficiency of the attractions to analyze how each attraction contributes to customer satisfaction in relation to its efficiency.

*FINDINGS*

* An importance-performance analysis of individual attraction’s efficiency and satisfaction showed that operational efficiency should not be the sole consideration in attraction installation.
* There is a negative relationship between the perception of crowdedness and visitor numbers (crowdedness can deter more people from visiting the park).
* Customer waiting is recognized as a negative experience by customers and lowers satisfaction.
* Waiting time works as an important factor in the customer’s decision-making process, along with cost, especially in service facilities such as theme parks
* From the actual data, roller coaster-type attractions have broader installation areas, which led to greater installation and repair costs.
* analysis shows that rotating-type attractions have higher efficiency and roller coaster-type attractions have relatively lower efficiency.
* Roller coaster-type attractions are found to have higher input values in terms of installation cost and repair cost implying the possibility of a significant correlation among the installation cost, installation size and repair cost.
* From the customer’s perspective, while efficient attractions with short waiting times can be important, what is more important are attractions they want to ride again, that is, attractions that deliver high satisfaction. And these attractions are what induce customers to revisit the theme park.
* While roller coaster-type attractions have relatively low operational efficiency, they can deliver high customer satisfaction and thus carry a brand effect that increases theme park customers’ revisit intention.

*FUTURE USE*

* The study analyses each attraction’s efficiency and satisfaction to discuss what attractions are appropriate for installation in future theme parks.
* The results of this study enabled the identification of efficient attractions from inefficient ones and the cause of attraction inefficiency, which shed light on possible considerations for future theme parks to achieve maximum efficiency in their attraction configuration and in the efficiency management of attractions.

**Managing Capacity and Flow at Theme Parks**<https://pubsonline.informs.org/doi/epdf/10.1287/opre.45.1.1>

This study aims to optimize daily operations in a theme park by setting ride capacities, managing visitor transitions, and suggesting routing tours. The study analyses customer classes and their service experiences and classifies rides into group, continuous, and individual rides. Through primary and secondary data collection, the study implements ride capacity, capacity management, and flow pattern models to evaluate the impact of closing, relocating, or adding a new ride. The study finds that there is a threshold value for the average number of rides per person per day, customer classes have different ride threshold values, and operating profits increase with the duration of visitors' in-park stay. The study then concludes that the average number of rides per person per hour is a better measure of customer satisfaction and park efficiency.

*PURPOSE OF STUDY*

* To consider daily operations at the park and focus on optimally setting a ride’s nominal capacity, analyzing, and managing the park’s visitors’ transition patterns, and developing models to suggest routing tours.
* Discuss different customer classes and their service experiences.
* Detailed analysis of the ride capacity model and its potential for improving park operational performance

*PRELIMINARY/ SECONDARY DATA*

* A customer survey suggested that further rides provided little improvement in customer satisfaction beyond a threshold level of an average number of rides.

*BACKGROUND ANALYSIS*

* From an operations perspective, the rides offered at the park can be classified broadly into three categories: (1) group rides, (2) continuous rides, and (3) individual rides.
* Effective management of the rides requires a clear understanding of ride capacity. Generally, a ride’s nominal capacity is determined by the number of operating units, the number of seats per operating unit, its trip time, and loading and unloading time.
* Variation in the customer’s arrival pattern and their entertainment preferences. Their perceptions of service can be classified into three main groups: (1) younger visitors, especially teenagers, (2) family visitors, (3) senior citizens.
* The behaviors of the three customer groups may be characterized by their transition behavior within the park, tolerance to waiting, and threshold for the number of rides per visit.
* Primary attractions for younger visitors lie in thrill rides, and teenagers appear to be less sensitive to long waits. Senior citizens are influenced by waiting times and tend to plan their rides to reduce waiting time. Family groups tend to have a lower tolerance for long waits than teenagers.

*DATA COLLECTION*

* Ride or operations-related data: ride nominal capacity, hourly throughput, wait times, queue lengths – used to define the performance functions for each ride, operation costs of the rides.
* Based on the classification of rides and customer transition behavior, the park was able to evaluate the impact of closing a specific ride, relocating a ride, or adding a new ride*.*
* Customer-related data: hourly arrival and departure counts, number of hours the park was open, queue lengths at rides, distribution of customer arrivals at the park, and distribution of the number of visitors in the park.

*MODELS IMPLEMENTED*

* Ride capacity model: to approximate a ride’s observed capacity, ride throughput (no. of customers served at each ride) is estimated by the minimum of observed ride capacity and queue length – a neural network model to estimate the observed capacity of the rides for any given nominal capacity.
* Capacity management model: to determine the capacity level for the rides in the park during different time periods, given that there are maximum tolerable queue lengths for the rides and customers have a threshold value for the number of rides they take during their visit to the park.
* Flow pattern model: find the optimum distribution of customer arrivals at the park.

*RELEVANT FINDINGS AND CONCLUSION*

* Customer flows paths: few people are willing to choose a ride twice in a row.
* Operating profits are positively correlated with the duration of visitors’ in-park stay.
* There is a threshold value for the average number of rides of about 12 rides per person per day.
* The increase in the number of guests attending the park tends to increase the length of in-park stay since it will take customers longer to reach their ride threshold.
* Distinct customer classes may have different ride threshold values.
* The average number of rides per person per hour is a better measure of customer satisfaction than the average number of rides per person per day, and consequently a better measure of efficient park operation.

**References**

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