Ulta Beauty: Waiting Line Simulation

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Project Overview

- Part 1: Discussing the Data
- Part 2: Simulation
- Part 3: What-if Analysis
- Part 4: Future Predictions

Part 1 : Discussing the Data

Introduction to Ulta Beauty

- What is Ulta Beauty
- Who are The Key Competitors
  - Competitive Advantages
  - Competitive Disadvantages
- Major Risk for Ulta in The Future

Current Waiting Line Situation

Location: 2314 W University Dr, Denton, TX

- 2-server, FCFS, Shared Queue Model
- Peak Traffic:
  - Friday, 12pm and 5pm
  - Saturday, 1pm
- Lowest Traffic:
  - Tuesdays and Sundays

Waiting Line Model

Data Collection Times:

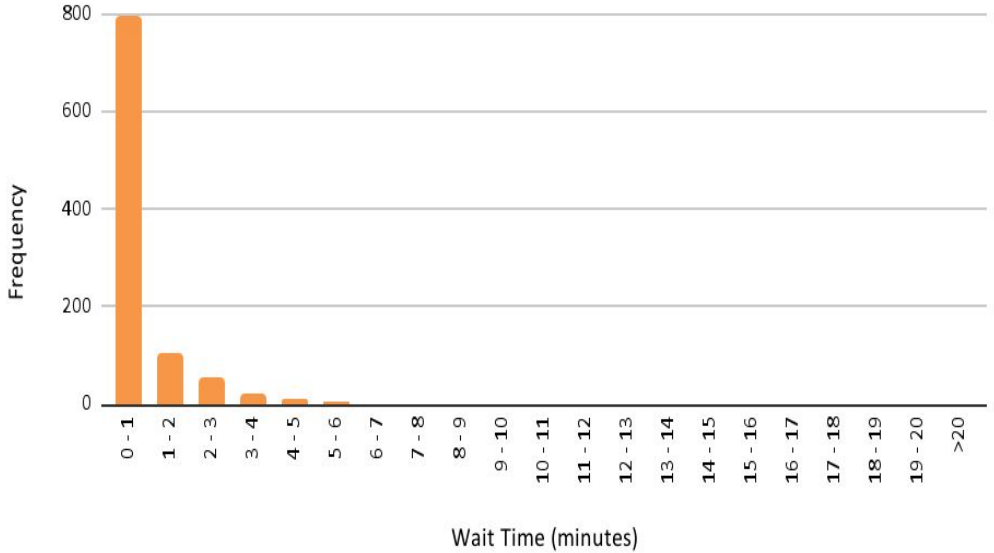
- Saturday morning, afternoon, and evening
- Sunday afternoon
- Tuesday afternoon

Data Collected: interarrival time, service rate, individual service rates of each server

Part 2 : Simulation

Simulation: Base Case

- Interarrival time: **1.22** minutes
- Service rate: **1.12** minutes
- Probability of waiting: **0.61**
- Average wait time: **1.17** minutes
- Maximum wait time: **6.40** minutes
- Probability of waiting more than one minute: **0.39**

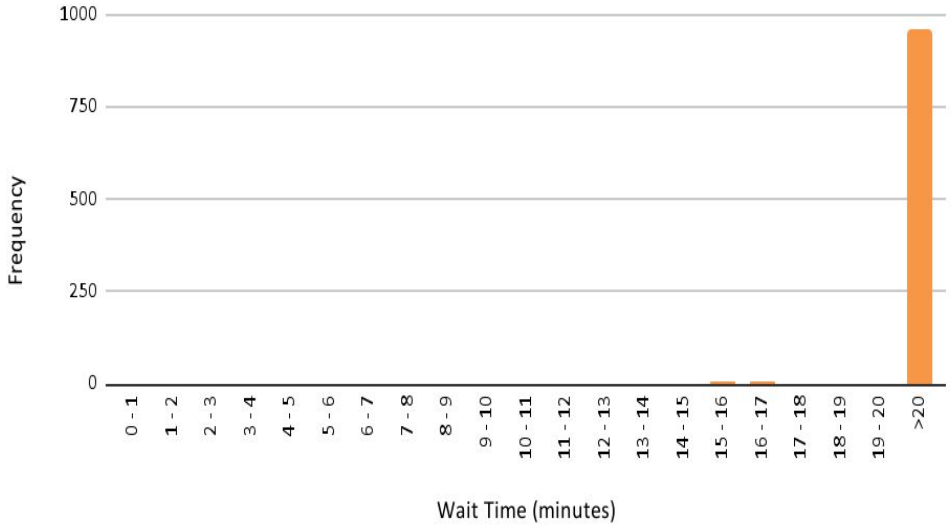


Simulation: Best Case

- Interarrival time: **2.0** minutes
- Service rate: **0.39** minutes
- Probability of waiting: **0.02**
- Average wait time: **0.01** minutes
- Maximum wait time: **1.84** minutes
- Probability of waiting more than one minute: **0.003**

Simulation: Worst Case

- Interarrival time: **0.83** minutes
- Service rate: **2.24** minutes
- Probability of waiting: **0.99**
- Average wait time: **266.47** minutes
- Maximum wait time: **539.12** minutes
- Probability of waiting more than 20 minutes: **0.97**

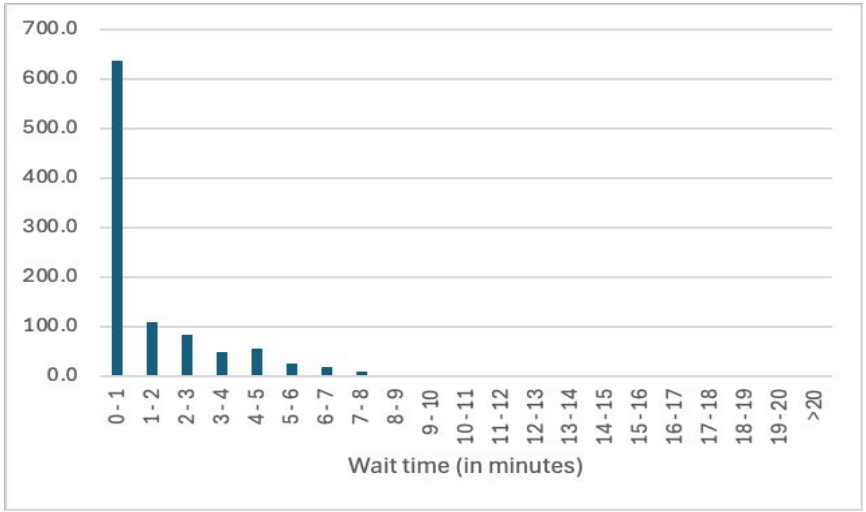


Part 3 : What-if Analysis

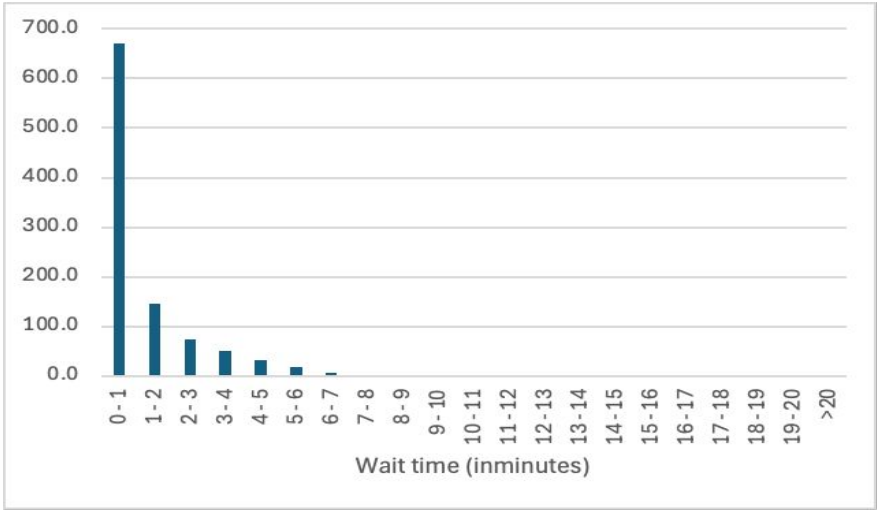
Scenarios

- Base case with 3 servers
- Base case with 4 servers
- One server at peak traffic time
- 3 servers at peak traffic time
- Slowest service rate with 2 servers

Base case with 3 servers decreases average wait time by approx **30%** and maximum wait time by approx **2 minutes**

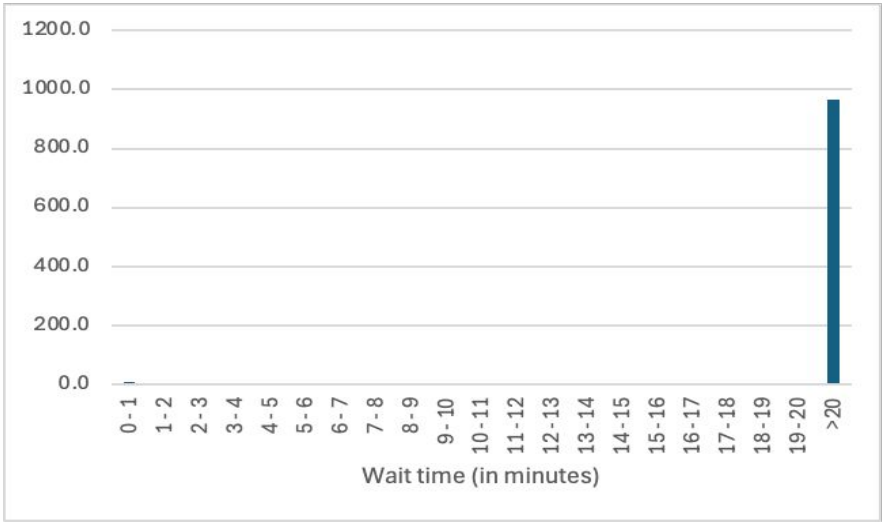


Base case with 3 servers

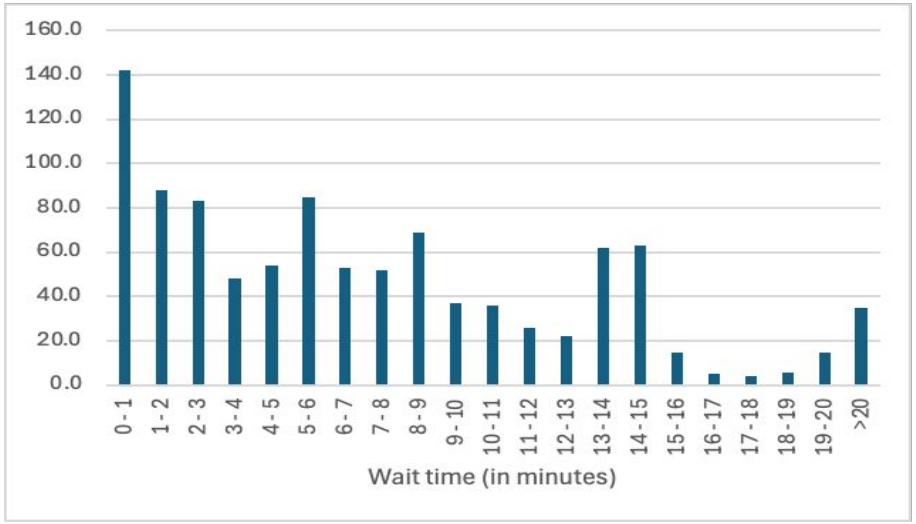


Base case with 4 servers

- 1 server at peak traffic is very inefficient with high unreasonable wait times
- 3 servers at peak traffic increases efficiency

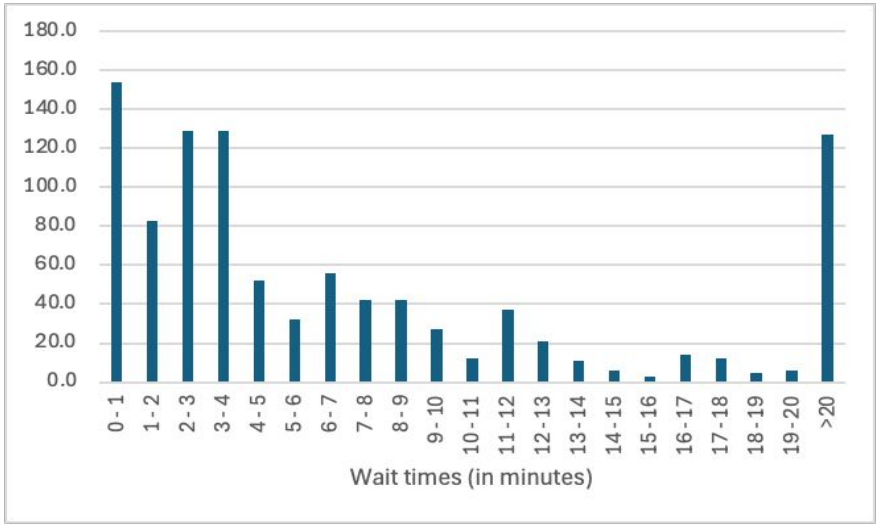


1 server at peak traffic time

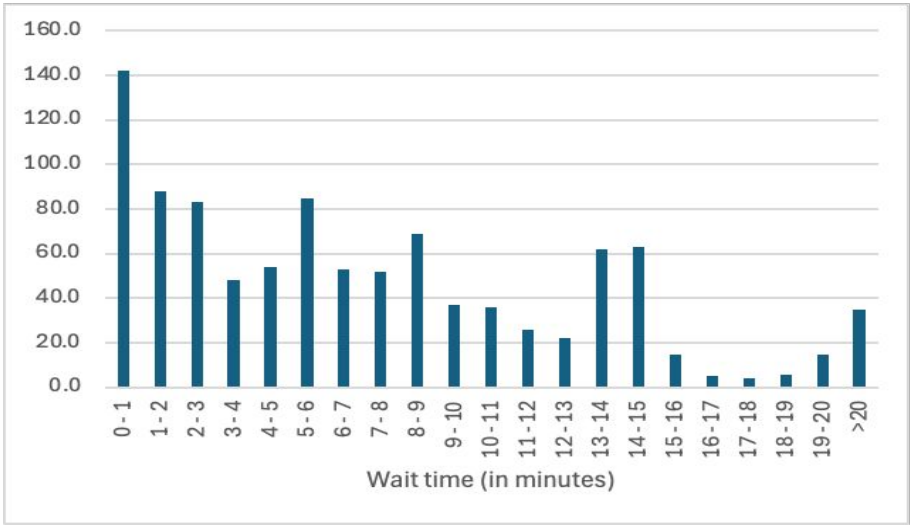


3 servers at peak traffic time

- 3 servers cuts both average wait time and maximum wait time in half

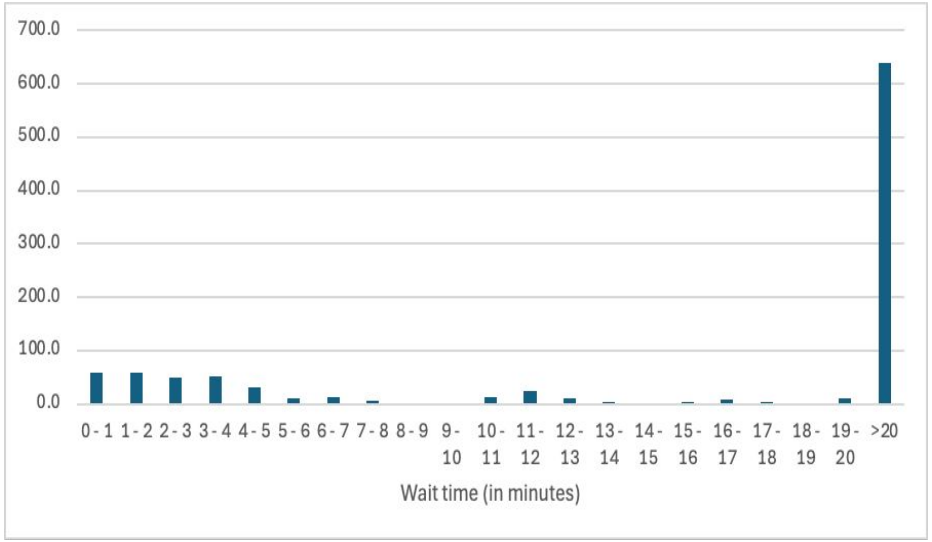


2 servers at peak traffic time



3 servers at peak traffic time

Slowest Service Rate



- base case interarrival rate & the slowest servers average service rate
- Slowest server: saturday afternoon server 2 (**2.24 min**)
- Average wait time increases from approx **1** minute to **15** minutes
- Maximum wait time increases from **5** to **30** minutes

Part 4 : Future Predictions

Improvements

- Future predictions suggest that peak traffic hours could become a challenge
- Self-service kiosk enhances efficiency and decreases wait times
- Increase servers during holiday and weekends similar to bath and body works
- Provide entertainment such as engaging displays to make waiting more enjoyable

Recommendations and Conclusions

- Introduce a third server only at peak traffic times to increase efficiency and avoid unnecessary costs
- Do not introduce a fourth server it adds little improvement and will incur additional costs
- Avoid understaffing, especially at peak traffic times

Q & A