

# AirCompSim

Unified Benchmark Report

Generated: December 19, 2025

Energy-Efficient Air Computing Simulator

# Executive Summary

## Overview:

- Total scenarios run: 45
- Paper Replication Scenarios: 25
- Advanced Scenarios: 20

## Paper Replication Results:

- Best Configuration: Users=20, UAVs=15  
Success Rate: 86.3%

## Advanced Benchmarks Highlights:

- UAV Positioning: Best is Random Positioning (87.1%)
- Charging Stations: Best is 1 Station (Center) (88.8%)
- Mobility Patterns: Best is Clustered Static (93.3%)
- Scheduling: Best is Latency-First (81.2%)

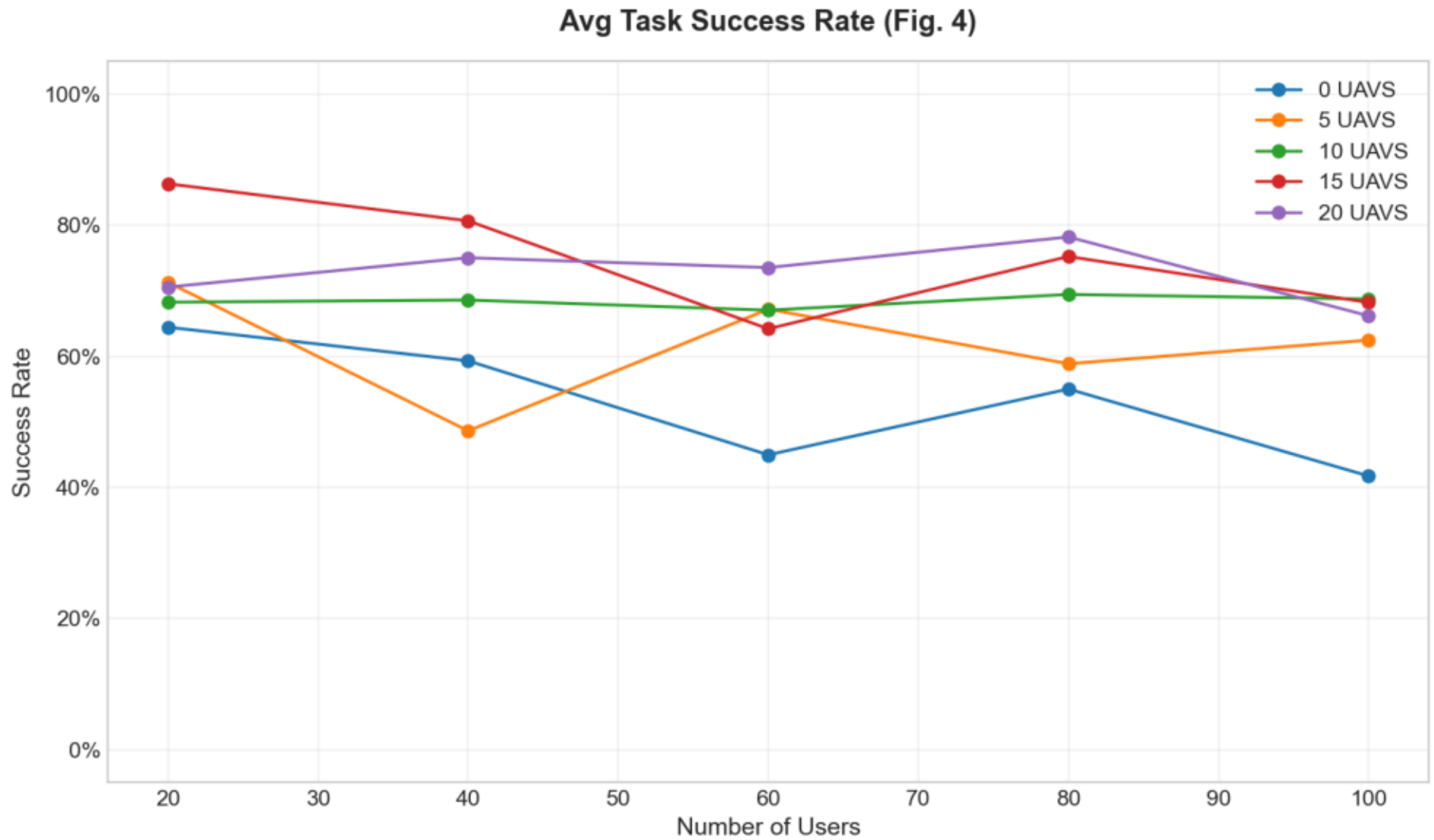
# 1. Paper Replication

Replication of results from *AirCompSim* paper (Figs 4-6)

# Replication Data

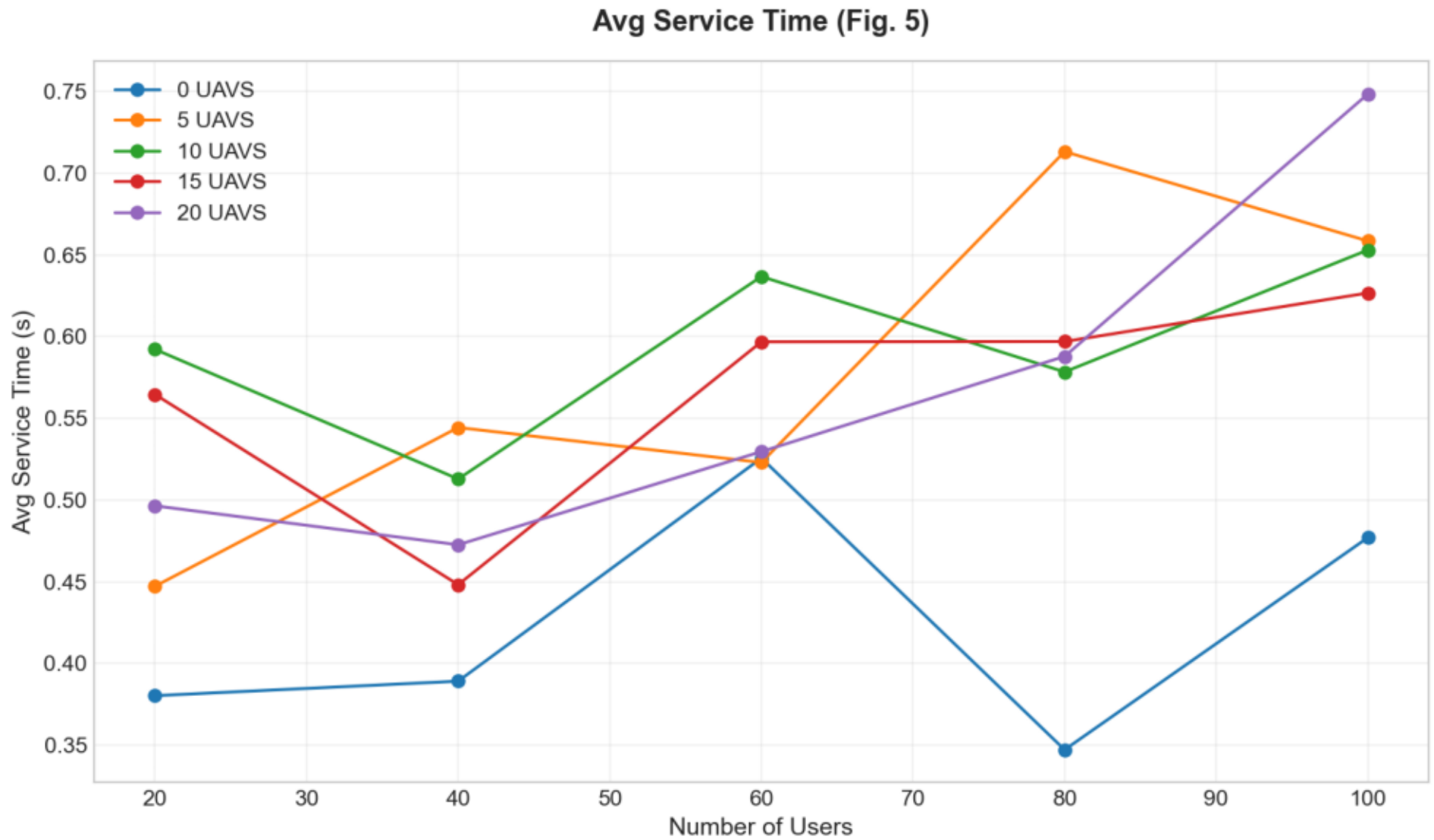
Name	Success	Latency	Energy (J)
Users=20, UAVs=0	64.4%	0.38	7428.00
Users=40, UAVs=0	59.3%	0.39	14126.00
Users=60, UAVs=0	45.0%	0.53	22215.00
Users=80, UAVs=0	55.0%	0.35	21692.00
Users=100, UAVs=0	41.8%	0.48	30061.00
Users=20, UAVs=5	71.3%	0.45	16286.00
Users=40, UAVs=5	48.6%	0.54	28112.00
Users=60, UAVs=5	67.2%	0.52	67846.00
Users=80, UAVs=5	58.9%	0.71	79372.00
Users=100, UAVs=5	62.5%	0.66	88813.00
Users=20, UAVs=10	68.3%	0.59	31208.00
Users=40, UAVs=10	68.6%	0.51	56385.00
Users=60, UAVs=10	67.0%	0.64	84511.00
Users=80, UAVs=10	69.4%	0.58	118363.00
Users=100, UAVs=10	68.7%	0.65	172138.00
Users=20, UAVs=15	86.3%	0.56	44645.00
Users=40, UAVs=15	80.7%	0.45	82620.00
Users=60, UAVs=15	64.2%	0.60	142473.00
Users=80, UAVs=15	75.2%	0.60	170333.00
Users=100, UAVs=15	68.2%	0.63	183513.00
Users=20, UAVs=20	70.6%	0.50	33426.00
Users=40, UAVs=20	75.0%	0.47	86382.00
Users=60, UAVs=20	73.5%	0.53	145287.00
Users=80, UAVs=20	78.2%	0.59	199084.00
Users=100, UAVs=20	66.2%	0.75	249366.00

**Figure 4: Success Rate**



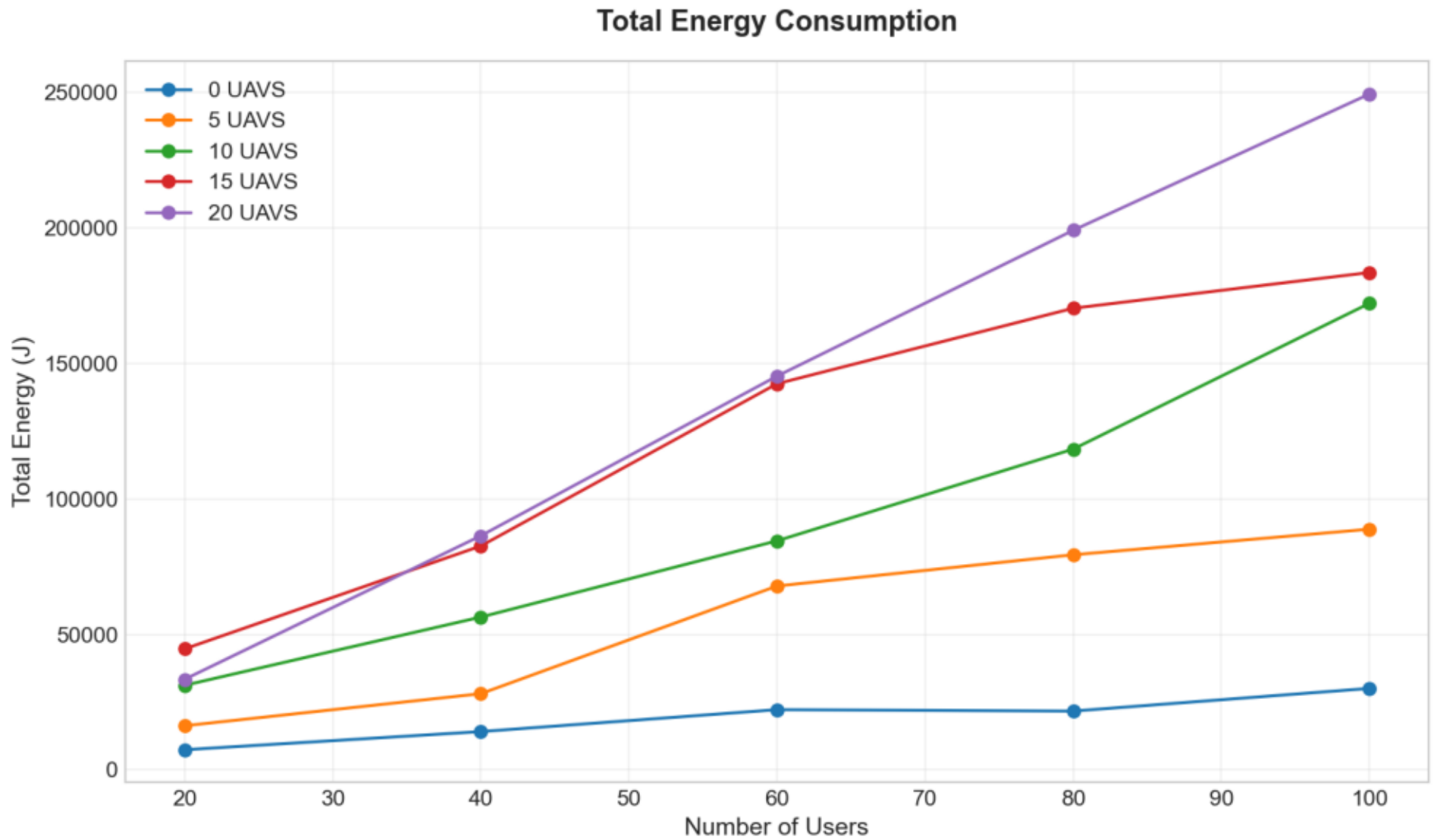
*Success Rate vs Users (Grouped by UAVs)*

**Figure 5: Service Time**



*Average Service Time vs Users*

**Figure 6: Energy Consumption**



*Total Energy Consumption vs Users*

## **2. Advanced Scenarios**

UAV Positioning, Charging, Mobility, and Scheduling

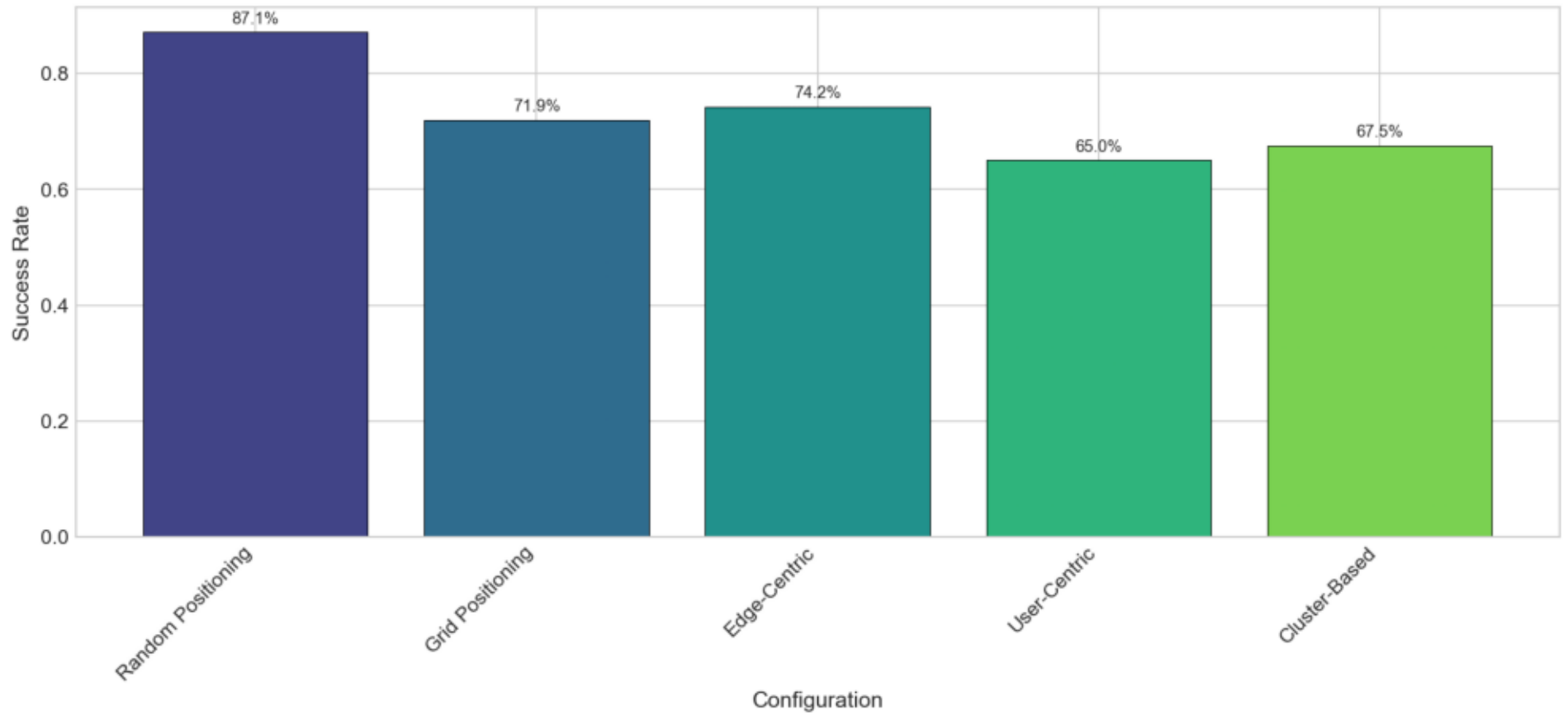
# **UAV Positioning**

# UAV Positioning Results

Name	Success	Latency	Energy
Random Positioning	87.1%	0.40	7221.00
Grid Positioning	71.9%	0.28	5713.00
Edge-Centric	74.2%	0.34	4279.00
User-Centric	65.0%	0.42	6974.00
Cluster-Based	67.5%	0.50	5864.00

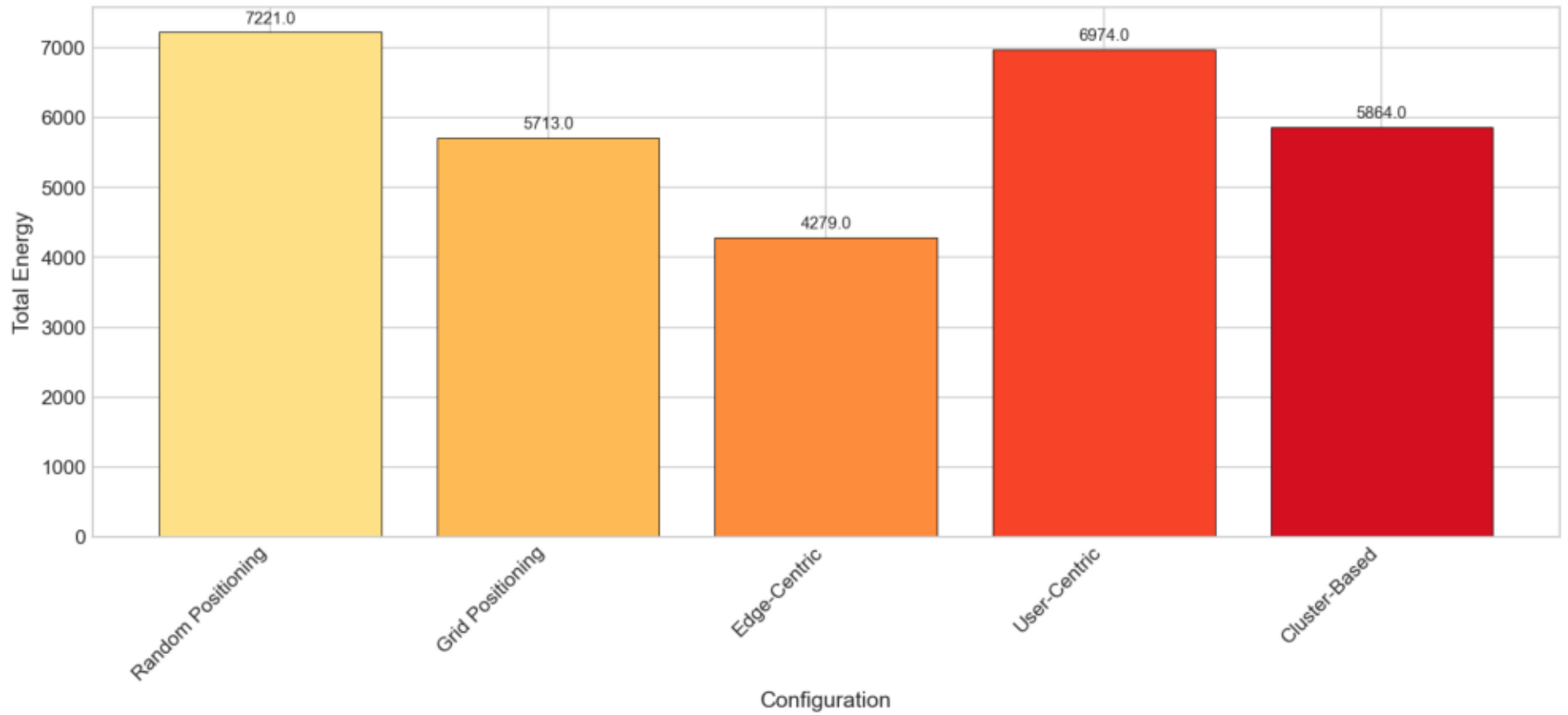
# Success Rate

UAV Positioning - Success Rate



# Energy Consumption

UAV Positioning - Energy



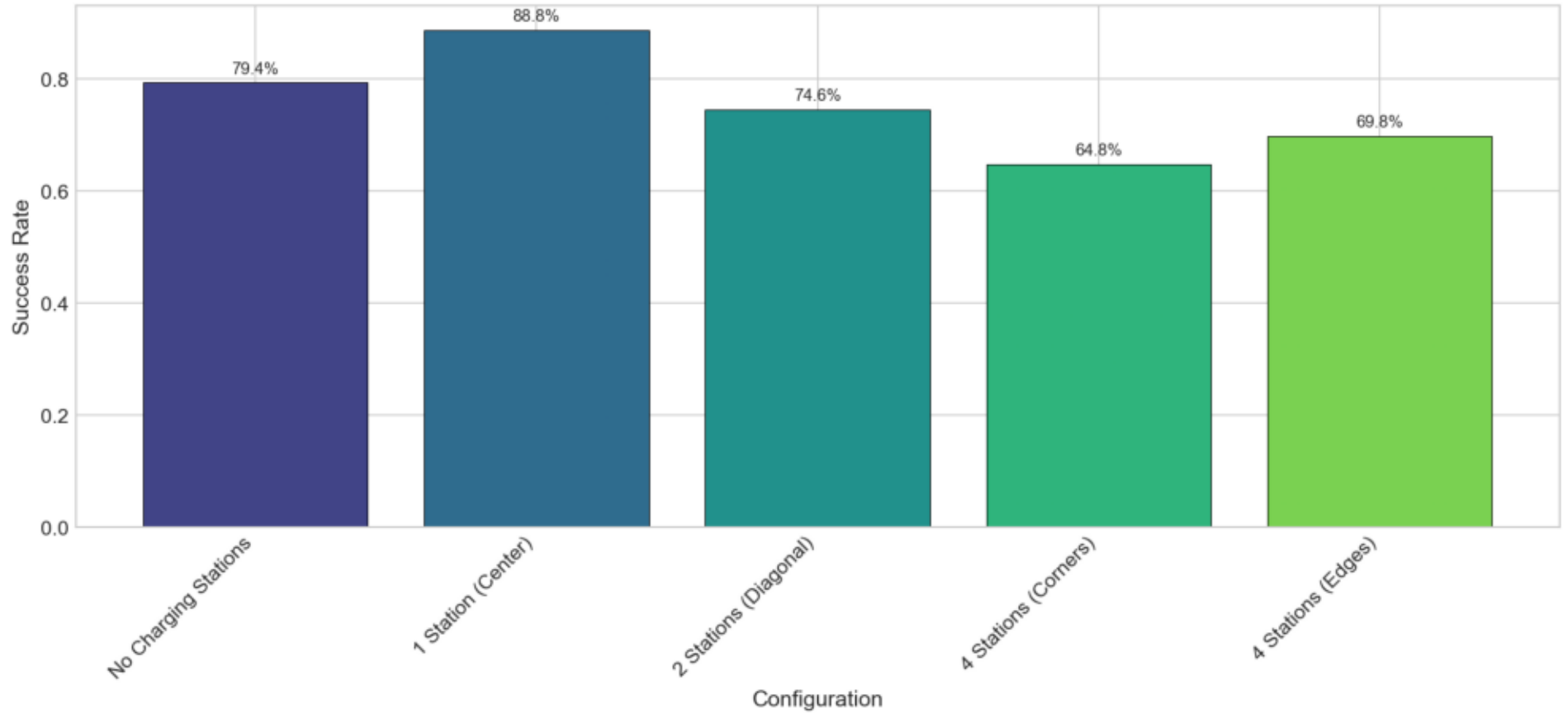
# **Charging Stations**

# Charging Stations Results

Name	Success	Latency	Energy
No Charging Stations	79.4%	0.42	4659.00
1 Station (Center)	88.8%	0.37	6564.00
2 Stations (Diagonal)	74.6%	0.41	6121.00
4 Stations (Corners)	64.8%	0.41	6743.00
4 Stations (Edges)	69.8%	0.52	4665.00

# Success Rate

Charging Impact - Success Rate



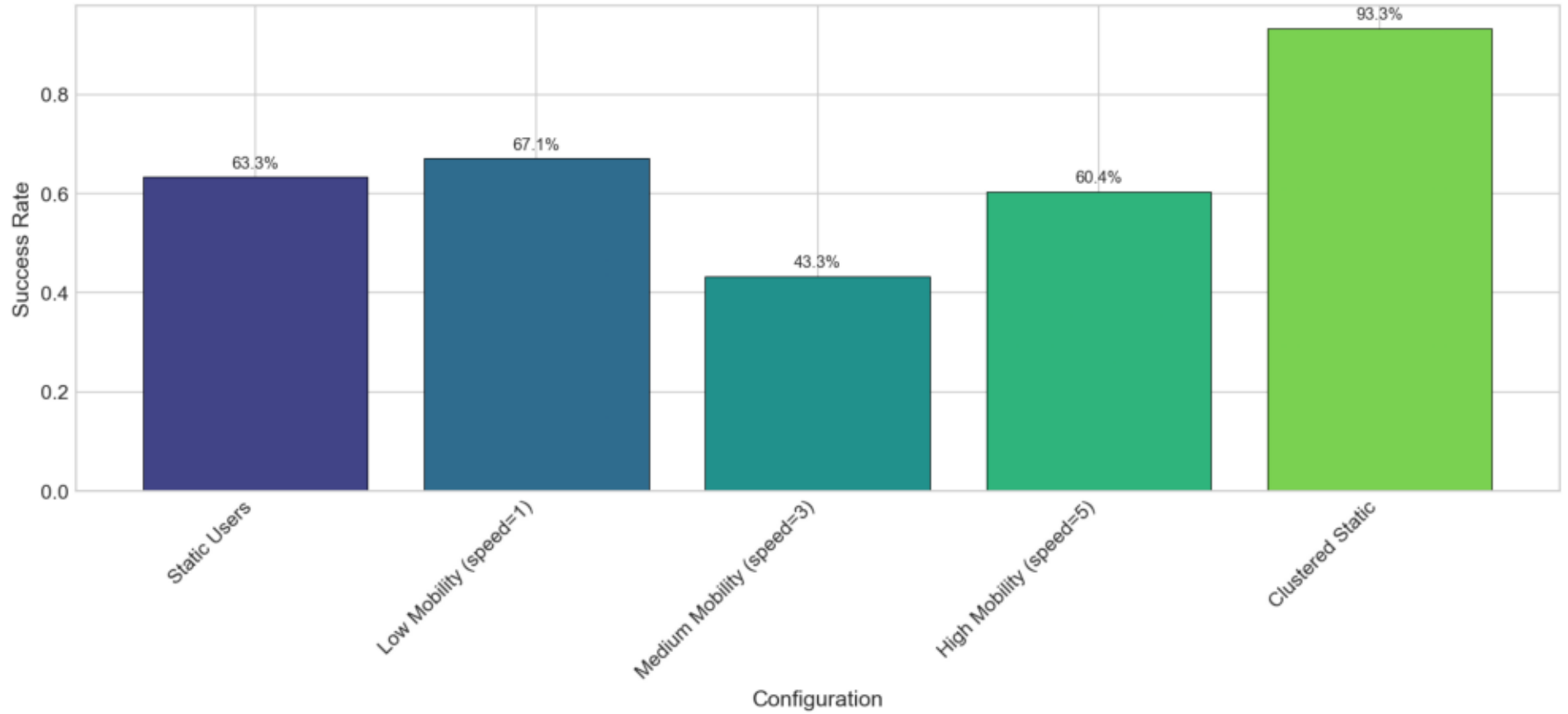
# **Mobility Patterns**

# Mobility Patterns Results

Name	Success	Latency	Energy
Static Users	63.3%	0.46	3414.00
Low Mobility (speed=1)	67.1%	0.41	5324.00
Medium Mobility (speed=3)	43.3%	0.55	2853.00
High Mobility (speed=5)	60.4%	0.39	3839.00
Clustered Static	93.3%	0.36	4724.00

# Success Rate

Mobility Impact - Success Rate



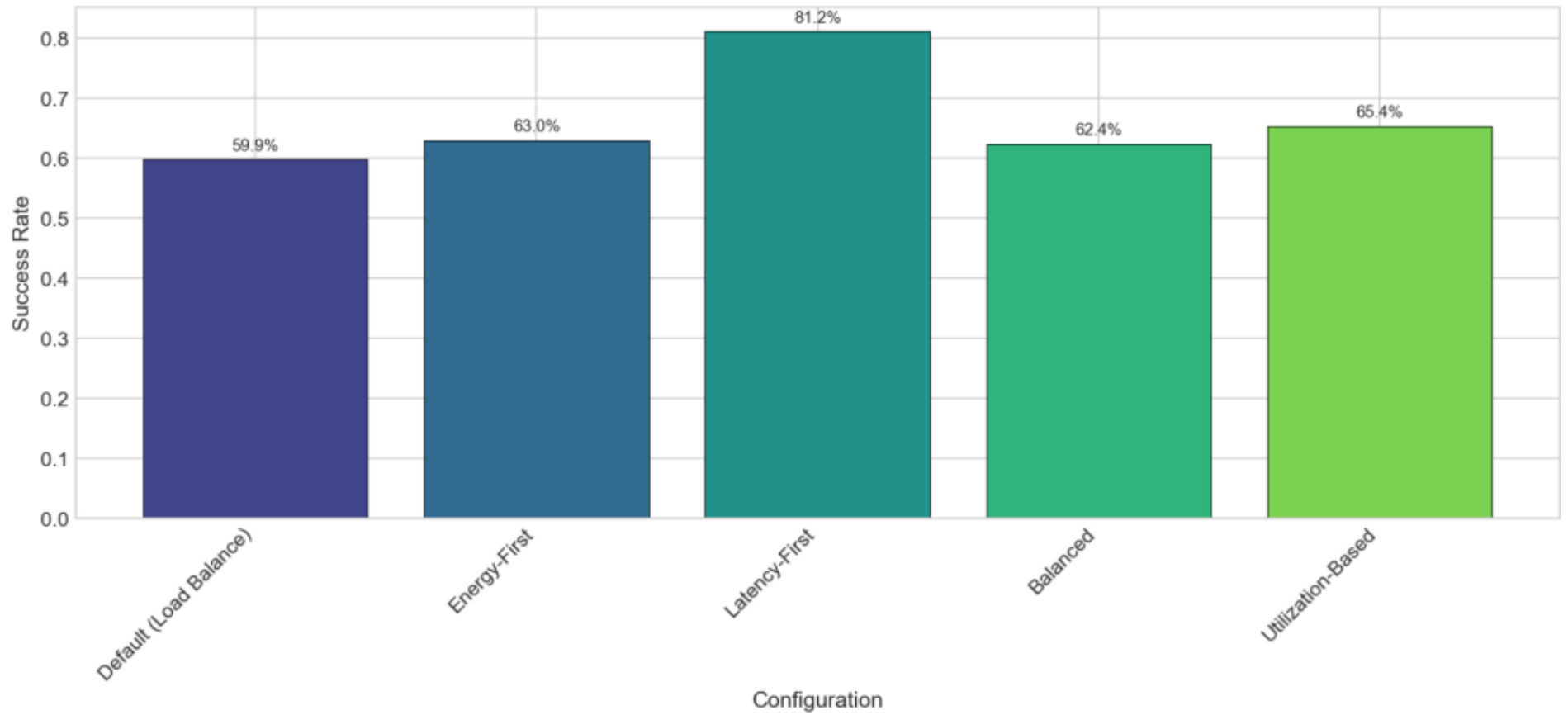
# Scheduling

# Scheduling Results

Name	Success	Latency	Energy
Default (Load Balance)	59.9%	0.40	5636.00
Energy-First	63.0%	0.52	6932.00
Latency-First	81.2%	0.49	7609.00
Balanced	62.4%	0.44	7434.00
Utilization-Based	65.4%	0.51	7100.00

# Success Rate

Scheduling - Success Rate



# Latency

Scheduling - Latency

