CALIFORNIA STATE UNIVERSITY
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IS 610 - Business Data Analysis

Project - Case A-U.S. Airways

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Submitted by:

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Introduction and Problem Statement

U.S. Airways was one of the major players in the airlines industry that faced challenges in maintaining their service quality and customer satisfaction after restructuring operations and repatriating all call center functions to the home country, the United States.

The core problem lies in improving the speed and quality of customer service for preferred customers while maintaining cost efficiency and operational effectiveness. By analyzing this problem, this report evaluates costs associated with the scheduling problem at the call center.

The Preferred Customer Desk proposal at U.S. Airways aims to improve service delivery for preferred customers—its most valuable and loyal passenger group—through a dedicated team of specially trained agents. The primary objectives include:

1. Reducing the average hold times for preferred customers from 45 seconds to 30 seconds.
2. Applying queueing formula to calculate the minimum number of agents
3. Designing an efficient staffing and scheduling system for full-time and part-time agents.

Pros:

- Establishing specific wait-time targets to increase customer satisfaction.
- Specialized agents trained will handle complex enquiries under shorter hold time.
- Assigning calls to specialized agents can reduce pressure and help in focusing on better results.

Cons:

- Specialized training will be required, which will increase costs.
- Addition of operational challenges including resource allocation and shift coordination can lead to complexities.

The strategy can deliver competitive benefits by fostering loyalty among high-value customers and improving overall operational effectiveness.

Analysis and Solutions

Determining the Minimum Number of Agents using the queuing formula

To meet hold time targets (45 seconds and 30 seconds), the queuing formula was applied.

$$T_q = \left(\frac{p}{m}\right) \times \left(\frac{U^{\sqrt{2(m+1)}-1}}{1-U}\right) \times \left(\frac{CV_a^2 + CV_p^2}{2}\right)$$

where,

p = 6.41 minutes (given)

m = minimum number of agents

a = data from exhibit 6

CVa^2 and CVp^2 = 1

U = p/a*m

Tq = hold time (45 and 30 sec)

Applying Queuing method for all 7 days on all time frames (taking Sunday as reference):

Hour	Sunday	m	U	Tq
0:00	7.3	3	0.25996111	14.7514972
1:00	9.8	3	0.01388889	28.731874
2:00	14.8	4	0.02083333	21.3698568
3:00	20.5	5	0.43801667	17.9024445
4:00	42	7	0.641	40.3079657
5:00	76.8	11	0.74589091	43.8692342
6:00	66.8	10	0.71364667	38.6722359
7:00	85.3	12	0.75940694	43.1129611
8:00	129	17	0.81067647	41.840186
9:00	117.3	16	0.78322188	34.0593579
10:00	109.5	15	0.77988333	36.5984641
11:00	119.3	16	0.79657604	39.3840836
12:00	117.3	16	0.78322188	34.0593579
13:00	111.8	15	0.79626444	43.5601704
14:00	119	16	0.79457292	38.528543
15:00	106	15	0.75495556	28.2599146
16:00	133.8	18	0.79412778	31.5596034
17:00	112.5	16	0.75117188	24.2489232
18:00	82.8	12	0.73715	34.9324446
19:00	60.3	10	0.644205	21.3318704
20:00	48	8	0.641	31.661744
21:00	33.8	6	0.60182778	40.0106382
22:00	18.5	4	0.49410417	41.384604
23:00	8	3	0.28488889	18.0479722

Figure 1: 30 seconds

Hour	Sunday	m	U	Tq
0:00	7.3	3	0.25996111	14.7514972
1:00	9.8	3	0.34898889	28.731874
2:00	14.8	4	0.39528333	21.3698568
3:00	20.5	5	0.43801667	17.9024445
4:00	42	8	0.560875	16.787811
5:00	76.8	12	0.68373333	21.3290834
6:00	66.8	11	0.6487697	18.4233902
7:00	85.3	13	0.70099103	21.5405264
8:00	129	18	0.76563889	22.9563621
9:00	117.3	17	0.73715	18.7340522
10:00	109.5	16	0.73114063	19.6951403
11:00	119.3	17	0.74971863	21.4103288
12:00	117.3	17	0.73715	18.7340522
13:00	111.8	16	0.74649792	23.0948443
14:00	119	17	0.74783333	20.9844107
15:00	106	15	0.75495556	28.2599146
16:00	133.8	19	0.75233158	17.9605437
17:00	112.5	16	0.75117188	24.2489232
18:00	82.8	13	0.68044615	17.7400924
19:00	60.3	10	0.644205	21.3318704
20:00	48	9	0.56977778	14.0880291
21:00	33.8	7	0.51585238	15.5779303
22:00	18.5	5	0.39528333	12.9190009
23:00	8	3	0.28488889	18.0479722

Figure 2: 45 seconds

# of Agents for Each Possible Shift							
Hour	# Part-time Agent	Hour	# Full-time Agents	Hour	# Agents Required	# Agents scheduled	Excess
0-4	0	0-4,5-9	0	0-1	3	3	0
1-5	0	1-5,6-10	0	1-2	3	3	0
2-6	2	2-6,7-11	0	2-3	4	4	0
3-7	3	3-7,8-12	0	3-4	5	5	0
4-8	3	4-8,9-13	0	4-5	8	8	0
5-9	4	5-9,10-14	0	5-6	12	12	0
6-10	1	6-10,11-15	0	6-7	11	11	0
7-11	0	7-11,12-16	5	7-8	13	13	0
8-12	5	8-12,13-17	3	8-9	18	18	0
9-13	3	9-13,14-18	0	9-10	17	17	0
10-14	0	10-14,15-19	0	10-11	16	16	0
11-15	0	11-15,16-20	9	11-12	17	20	3
12-16	0	12-16,17-21	0	12-13	17	17	0
13-17	0	13-17,18-22	0	13-14	16	17	1
14-18	0	14-18,19-23	0	14-15	17	17	0
15-19	0	15-19,20-0	7	15-16	15	15	0
16-20	0	16-20,21-1	0	16-17	19	19	0
17-21	1	17-21,22-2	1	17-18	16	18	2
18-22	0	18-22,23-3	0	18-19	13	18	5
19-23	0	19-23,0-4	0	19-20	10	11	1
20-0	0	20-0,1-5	0	20-21	9	9	0
21-1	0	21-1,2-6	0	21-22	7	7	0
22-2	0	22-2,3-7	0	22-23	5	8	3
23-3	2	23-3,4-8	0	23-0	3	10	7
Total	25	Total	25				
		Total Cost	$5,396				

hourly	**17.5**
part time	**4**
full time	**8.5**

Figure 3: Sample of total cost for Sunday for 30 seconds

# of Agents for Each Possible Shift							
Hour	# Part-time Agents	Hour	# Full-time Agents	Hour	# Agents Required	# Agents scheduled	Excess
0-4	0	0-4,5-9	0	0-1	3	3	0
1-5	0	1-5,6-10	0	1-2	3	3	0
2-6	2	2-6,7-11	0	2-3	4	4	0
3-7	3	3-7,8-12	0	3-4	5	5	0
4-8	2	4-8,9-13	0	4-5	7	7	0
5-9	4	5-9,10-14	0	5-6	11	11	0
6-10	1	6-10,11-15	0	6-7	10	10	0
7-11	4	7-11,12-16	3	7-8	12	14	2
8-12	4	8-12,13-17	1	8-9	17	17	0
9-13	0	9-13,14-18	3	9-10	16	16	0
10-14	0	10-14,15-19	0	10-11	15	15	0
11-15	0	11-15,16-20	8	11-12	16	16	0
12-16	0	12-16,17-21	2	12-13	16	16	0
13-17	0	13-17,18-22	1	13-14	15	15	0
14-18	0	14-18,19-23	0	14-15	16	18	2
15-19	0	15-19,20-0	5	15-16	15	15	0
16-20	0	16-20,21-1	0	16-17	18	18	0
17-21	0	17-21,22-2	0	17-18	16	18	2
18-22	0	18-22,23-3	0	18-19	12	16	4
19-23	0	19-23,0-4	0	19-20	10	11	1
20-0	0	20-0,1-5	0	20-21	8	8	0
21-1	0	21-1,2-6	0	21-22	6	6	0
22-2	1	22-2,3-7	0	22-23	4	6	2
23-3	2	23-3,4-8	0	23-0	3	8	5
Total	23	Total	23				
		Total Cost	$5,031				

hourly	**17.5**
part time	**4**
full time	**8.5**

Figure 4: Sample of total cost for Sunday for 45 seconds

Results

Metric	45-Seconds Target	30-Seconds Target
Total Cost	$37,412	$39,019
Peak Hour Identified	Yes	Yes
Staff Required	Lower	Higher

Cost Difference = Cost at 30-Second Target – Cost at 45-Second Target

= $39,019 - $37,412

= $1607

Percentage Change= 1607/ 37412 *100

= 4.3%

Proposed Scheduling for Cost Efficiency

Assigning entire shifts for full-time agents and specific peak periods for part time agents avoiding over staffing.

45 sec hold time

Day	Full Time	Part Time	Total
Sunday	23	23	46
Monday	26	26	52
Tuesday	24	24	48
Wednesday	25	24	49
Thursday	28	27	55
Friday	28	28	56
Saturday	18	18	36
Total	172	170	342

30 sec hold time

Day	Full Time	Part Time	Total
Sunday	25	25	50
Monday	27	27	54
Tuesday	25	25	50
Wednesday	26	24	50
Thursday	29	28	57
Friday	28	28	56
Saturday	19	19	38
Total	179	176	355

Assumptions:

- Full-time agents: 8.5 hours/day (4-1-4 shift structure).
- Part-time agents: 4-hour shifts.
- Hourly wage: $14/hour + 25% benefits = **$17.50/hour**.

Proposed Staffing Schedule for 30 seconds

Day	Shift 1 (8 AM – 4 PM)	Start Shift 2 (4 PM – 12 AM)	Part-Time (Flexible)	Total
Sunday	16 Full-time	9 Full-time	25 Part-time	50
Monday	18 Full-time	9 Full-time	27 Part-time	54
Tuesday	16 Full-time	9 Full-time	25 Part-time	50
Wednesday	17 Full-time	9 Full-time	24 Part-time	50
Thursday	19 Full-time	10 Full-time	28 Part-time	57
Friday	18 Full-time	10 Full-time	28 Part-time	56
Saturday	12 Full-time	7 Full-time	19 Part-time	38
TOTAL	107	71	176	355

Staffing Schedule for 45 seconds

Day	Shift 1 (8 AM – 4 PM)	Start Shift 2 (4 PM – 12 AM)	Part-Time (Flexible)	Total
Sunday	15 Full-time	8 Full-time	23 Part-time	46
Monday	17 Full-time	9 Full-time	26 Part-time	52
Tuesday	16 Full-time	8 Full-time	24 Part-time	48
Wednesday	16 Full-time	9 Full-time	24 Part-time	49
Thursday	18 Full-time	10 Full-time	27 Part-time	55
Friday	18 Full-time	10 Full-time	28 Part-time	56
Saturday	12 Full-time	6 Full-time	18 Part-time	36
TOTAL	110	60	170	342

1. Peak Days and Staffing Needs

Thursday and Friday consistently require the highest total staff for both hold times:

45-second target: 55 (Thursday), 56 (Friday)

30-second target: 57 (Thursday), 56 (Friday)

Inference: These days are likely to have higher call volumes, necessitating more agents during peak times.

2. Part-Time Agent Utilization

Thursday and Friday rely heavily on Part-Time agents:

45-second target: 27–28 Part-Time agents

30-second target: 28 Part-Time agents

Inference: Part-Time staff are being used strategically to handle increased call demand without overburdening Full-Time agents.

3. Sunday and Saturday Are Off-Peak Days

Saturday has the lowest staffing requirements:

45-second target: 36 Total Staff

30-second target: 38 Total Staff

Sunday also shows reduced requirements compared to weekdays.

Inference: Call volumes drop significantly on weekends, allowing for a smaller team to maintain service levels.

Conclusion

- Reducing the wait time from 45 seconds to 30 seconds requires hiring more agents to handle the increased demand for quicker service.
- As calculated earlier, moving to a 30-second standard increases the staffing costs by approximately 4-5% compared to the 45-second standard.

By implementing a 30-second average wait time, supported by optimized scheduling and a hybrid staffing model, U.S. Airways can deliver superior service to its flagship customers, enhancing loyalty and positioning itself as a leader in customer satisfaction, all while controlling incremental costs.