CASE 49
WACHOVIA BANK AND TRUST COMPANY, N.A. (B):
Piedmont Operations Center Scheduling

A. Mebane Davis was reviewing the staffing needs for the Proof Department. He had recently become the manager of the Piedmont Operations Center of Wachovia Bank and Trust of North Carolina and was anxious to continue the work begun by his predecessor in evaluating a staffing and scheduling problem. As the bank continued to grow, it was necessary to make the staffing and scheduling process more formal to ensure continued cost-effective performance.

Company Background and Operations

Wachovia Bank conducted retail, corporate, and international banking activities and provided a full line of trust services to its customers. It also provided its domestic and international customers a full line of corporate banking services, including cash management, foreign exchange, and money market services. It had total assets of $3.5 billion and net income of $30.5 million.

Because of the statewide nature of Wachovia's business and its rapid growth in recent years, the paper-processing functions of the bank had been divided among five similar operations centers strategically located around the state to provide services to each geographic area. The Piedmont Operations Center in Winston-Salem, North Carolina, was the largest, servicing 58 branches in 10 cities in the surrounding area.

Proof Department

The Proof Department was the heart of the bank's check-clearing operations. The department received and processed checks and other documents to clear them in the shortest possible time to save on float, which averaged $220 million a day systemwide. The department was charged with the responsibility for sorting checks, proving the accuracy of deposits, distributing checks, and listing transactions arising from the daily operations of the bank.

The physical facility consisted of a large room filled with 35 proof machines and several tables. As the couriers arrived, they left their bags of paperwork on a table on one side of the room. The bags were emptied and the contents distributed to one of three tables on the other side of the room according to the type of work; tables were for commercial, personal, and "big-ticket" work. The big-ticket items were always processed first, followed by commercial and then personal items.

This case was based on a Supervised Business Study prepared by Charlotte R. Donnelly (Darden, Class of 1979).

The couriers made several pickups each day, including a visit to each branch shortly after 2:00 P.M. to pick up all the work that was to be included in that banking day. The proof operators were responsible for processing all this work by the end of their day. Work that was accepted at the branches after 2:00 P.M. and was picked up by the couriers at a later time could be left to be done on a subsequent shift. When the proof operators arrived at work in the morning, they finished any personal work left from the day before. The first courier was scheduled to arrive with new work from the branches at about 11:45 A.M., and most of the work arrived between noon and 2:00 P.M.

The department operated from 8:00 A.M. to 6:00 P.M. on Monday and 9:00 A.M. to 6:00 P.M. on Tuesday through Friday. Despite the practice by other banks of handling check processing almost entirely at night, Wachovia believed it was important to give its employees a normal workday.

The volume of items processed in the Proof Department had increased significantly in the last two years, from 38.01 million to 42.975 million. The scheduling problem in the department was magnified because of the uneven nature of the volume. Exhibit 1 contains weekly proof volumes (deseasonalized to take out the yearly seasonal pattern) going back to the beginning of the prior year. This volume pattern led management to use a large part-time staff to cover peak loads. Currently, 14 full-time and 22 part-time proof operators were working at the center. Each operator had an average processing rate of 1,000 items per hour.

Forecasting

The first thing Mr. Davis had to do was forecast demand for next week, week 67 (April 10–14), and then he would need to work out a schedule for the number of full- and part-time staff to meet the predicted demand. A couple of simple forecasting methods had been suggested to him. One was to use the previous week's actual deseasonalized demand for the next week's forecast of the deseasonalized number of checks. Another was to use his predecessor's long-run forecast of weekly volume of 730,000. This number represented the typical deseasonalized volume and was based on years of experience with the operations center. Davis wondered how accurate these simple methods were and whether there might be some other better approach.

He would use his forecast to determine how many hours of additional part-time workers to schedule for the next week. His base schedule, which includes full-time and some part-time workers, was enough to do 600,000 checks; he could add as many additional part-time hours as he wished to the schedule. If he scheduled either full- or part-time hours, he had to pay for them even if the workers completed the check processing early. On the other hand, if the volume of checks was so high that the checks couldn't be processed in the hours he scheduled for the week, he would need to pay overtime wages (which were 50 percent above regular wages) to complete the work for the week. There was no requirement to finish all checks on the day they arrived, but the checks that arrived during the entire week had to be done by Friday afternoon.

EXHIBIT 1 Deseasonalized Weekly Proof Volumes

Week	Volume (000)	Week	Volume (000)
1	633.7	34	809.7
2	628.8	35	778.6
3	725.6	36	818.9
4	670.8	37	789.5
5	718.1	38	791.2
6	752.0	39	842.5
7	714.2	40	875.9
8	740.5	41	847.3
9	817.2	42	894.7
10	721.8	43	855.5
11	710.3	44	836.5
12	741.7	45	763.9
13	827.0	46	820.3
14	824.9	47	780.2
15	726.2	48	828.7
16	813.4	49	838.2
17	780.7	50	910.7
18	828.2	51	921.0
19	804.6	52	711.5
20	816.2	53	694.7
21	836.9	54	811.4
22	735.2	55	733.1
23	800.6	56	749.9
24	814.7	57	733.8
25	757.2	58	849.4
26	849.2	59	846.5
27	696.5	60	802.9
28	796.0	61	823.9
29	802.7	62	814.6
30	833.5	63	777.4
31	807.8	64	797.3
32	785.8	65	781.5
33	760.7	66	931.4

His first task was to get a handle on the forecasting problem; then he could easily use it to find the number of part-time hours to schedule. He first planned to develop a forecast of deseasonalized checks. Then for the week of April 10–14, he could use the seasonal index of 0.975 to adjust the deseasonalized forecast. A seasonal index less than 1 meant that the week had an expected volume less than the average week.

CASE 50
WACHOVIA BANK AND TRUST COMPANY, N.A. (B): SUPPLEMENT

Three procedures were suggested for forecasting the weekly work-load requirements of the Piedmont Operations Center Proof Department.

Method 1. This simple forecasting scheme uses the previous week's volume to forecast each succeeding week's volume. Based on the data in Exhibit 1, the forecast for week 13 would be 741.7 (the volume for week 12). This procedure would then use the volume of week 66 to forecast the volume during week 67.

Method 2. This approach uses a forecast suggested by Mr. Mebanes' predecessor for each week in the future. This estimate of 730.0 reflects the prior experience during the entire time that the predecessor was on the job and would not need to be changed each week.

Method 3. This method is something of a compromise between the previous two. With Method 1, each forecast is equal to the previous actual volume. With Method 2, the forecast is based on the long-run experience with the volume of checks and doesn't change from period to period. With this compromise method, each forecast is calculated by putting some weight (alpha) on the previous actual volume and some weight (with a total weight of one) on the previous long-run forecast:

$$\text{Next forecast} = \text{Alpha} * (\text{Volume}) + (1 - \text{Alpha}) * (\text{Previous forecast})$$

where alpha is the weight given to the most recent actual volume. This method is called "exponential smoothing."

If equal weights are used, this forecasting method is described by the following equation:

$$F_{t+1} = 0.5 * (X_t) + 0.5 * (F_t)$$

where X_t is the volume in period t and F_t is the forecast in period t. Of course, to evaluate whether the forecast is working, we want to see whether F_{t+1} is close to X_{t+1}, not X_t.

Exhibit 1 shows a spreadsheet that calculates these forecasts. Notice that this forecasting method uses the forecast given by Mr. Mebanes' predecessor to start but updates the forecast each period using the new observation of volume.

This method calculates in week 12 a forecast of 735.4 for the volume of checks in week 13. Continuing the process for all of the data, the forecast for week 67 would be 860.4.

EXHIBIT 1 Spreadsheet

	A	B	C	D	
1		ALPHA =	0.5		
2					
3	WEEK #	VOLUME	AVERAGE	FORECAST	BACKGROUND
4	1	633.7	**730.0**←		
5	2	628.8	679.4	730.0	730.0
6	3	725.6	702.5	679.4	
7	4	670.8	686.6	702.5	
8	5	718.1	702.3	686.6	
9	6	752.0	727.2	702.3	
10	7	714.2	720.7	727.2	
11	8	740.5	730.6	720.7	
12	9	817.2	773.9	730.6	
13	10	721.8	747.9	773.9	
14	11	710.3	729.1	747.9	
15	12	741.7	**735.4**←	729.1	+C1*B15
16	13	827.0	781.2	735.4	+(1-C1)*C14
17	14	824.9	803.0	781.2	
18	15	726.2	764.6	803.0	
19	16	813.4	789.0	764.6	
20	17	780.7	784.9	789.0	
21	18	828.2	806.5	784.9	
22	19	804.6	805.6	806.5	
23	20	816.2	810.9	805.6	
24	21	836.9	823.9	810.9	
25	22	735.2	779.5	823.9	
26	23	800.6	790.0	779.5	
27	24	814.7	802.4	790.0	
28	25	757.2	779.8	802.4	
29	26	849.2	814.5	779.8	
30	27	696.5	755.5	814.5	
31	28	796.0	775.7	755.5	
32	29	802.7	789.2	775.7	
33	30	833.5	811.3	789.2	
34	31	807.8	809.6	**811.3**←	+C33
35	32	785.8	797.7	809.6	
36	33	760.7	779.2	797.7	
37	34	809.7	794.4	779.2	

(Continued)

EXHIBIT 1 *Concluded*

38	35	778.6	786.5	794.4
39	36	818.9	802.7	786.5
40	37	789.5	796.1	802.7
41	38	791.2	793.6	796.1
42	39	842.5	818.1	793.6
43	40	875.9	847.0	818.1
44	41	847.3	847.1	847.0
45	42	894.7	870.9	847.1
46	43	855.5	863.2	870.9
47	44	836.5	849.9	863.2
48	45	763.9	806.9	849.9
49	46	820.3	813.6	806.9
50	47	780.2	796.9	813.6
51	48	828.7	812.8	796.9
52	49	838.2	825.5	812.8
53	50	910.7	868.1	825.5
54	51	921.0	894.5	868.1
55	52	711.5	803.0	894.5
56	53	694.7	748.9	803.0
57	54	811.4	780.1	748.9
58	55	733.1	756.6	780.1
59	56	749.9	753.3	756.6
60	57	733.8	743.5	753.3
61	58	849.4	796.4	743.5
62	59	846.5	821.5	796.4
63	60	802.9	812.2	821.5
64	61	823.9	818.0	812.2
65	62	814.6	816.3	818.0
66	63	777.4	796.9	816.3
67	64	797.3	797.1	796.9
68	65	781.5	789.3	797.1
69	66	931.4	860.4	789.3
70				860.4