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HOW TIME IS SPENT ON A FORECAST SHIFT

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1. Introduction

Modernization and Restructuring (MAR) is now rising above the horizon in the National Weather Service. This period in the National Weather Service will substantially change the manner in which forecasts are produced in the field office. As new technology, such as NEXRAD and AWIPS, enters the field office environment, demands for new products and services from this technology will increase. How these demands will be met with present and future staffing in an eight hour forecast shift through different stages in MAR is now being examined. Before a new framework is carved out for the future, the NWS must ascertain how our forecasters presently utilize their time on shift. To quantify how time is presently spent on shift, Central Region, Meteorological Services Division conducted a forecaster time utilization survey through its field forecast offices.

2. Methodology

During the months of November and December of 1989 and January of 1990, each forecaster in Central Region was given ten survey forms (Fig. 1) to complete after his/her shift. Because the day shift is usually the busiest at most offices, each forecaster was instructed to complete four of the ten survey forms for day shifts. The forecaster indicated which shift he/she was working and was asked to categorize the forecast difficulty of the shift as either easy, average, or difficult. The survey requested that each forecaster estimate the time spent on basic core tasks of the forecast shift. The basic core tasks of a forecast shift identified on the survey were:

1. Forecast Analysis
2. Forecast Composition
3. Broadcasting
4. External Coordination
5. Quality Control

6. Management of Office Systems
7. Phone Calls
8. Other Duties

The forecasters were given the opportunity to list significant time spent on "other duties" and to list those duties. Other duties included research, meal breaks, focal point duties, and time that was unaccounted for. Over 1,000 surveys were completed by field forecasters in the Central Region and tabulated for this study.

3. Results

Of the 1,000 responses that were received, about 50 percent categorized their shifts as average in difficulty, 21 percent as easy, and 29 percent as difficult (Fig. 2).

Figure 3 depicts average time spent in each of the core tasks for all shifts and all categories of forecast difficulty. As expected, the most time spent on a shift was in weather analysis with 3 hours, 16 minutes. Second was in message composition with 1 hour, 36 minutes. Time spent on coordination, quality control, management of computer systems, phone calls, and broadcasting on Weather Radio (NWR) were all between 20 and 23 minutes. Time available for "other duties" was 1 hour, 17 minutes.

Figure 4 indicates the percentage of time spent in each particular core task in an eight hour shift for all shifts and difficulties. Forty-one percent of the time was spent on analysis, 20 percent on message composition, and 5 percent each on management of computer systems, quality control, broadcasting on NWR, and phone calls. Four percent of the time was spent on coordination. Eighteen percent of an eight hour shift was available for other duties.

Figure 5 shows average time spent versus each core task for midnight, day, and evening shifts. As expected, time spent on analysis, composition, coordination, and phone calls was highest during the day shift compared to the midnight and evening shifts. A significant minimum of time spent on other duties was depicted during the day shift.

Average time versus a breakdown of tasks and forecast difficulty is shown in Figure 6. As forecast difficulty increases from easy to difficult, time spent on analysis increases by over an hour. The same trend holds true for time spent on message composition, increasing about 45 minutes. Coordination time increases about 11 minutes. Time spent on NWR remains the same for all difficulty categories -- about 23 minutes. A dramatic decline is seen in time spent on "other duties." It decreases from 2 hours, 30 minutes on an easy shift to about 30 minutes on a difficult shift. There is also a decline in time spent on the management of systems with increasing difficulty. This trend may indicate that forecasters are forced to accept degraded computer performance during busy shifts. There are small peaks in time spent on quality control and phone calls during an "average" shift. This shows that forecasters have a limit to the amount of time they can devote to these tasks as shift difficulty increases.

FORECASTER TIME UTILIZATION SURVEY

OFFICE WSFO _____ DATE: _____

FORECAST DIFFICULTY (circle one)

EASY AVERAGE DIFFICULT

SHIFT: (circle one)

MID DAY EVE

1. ESTIMATE THE APPROXIMATE TIME SPENT PURELY ON FORECAST ANALYSIS (looking at AFOS, radar, SWIS, doing hand analysis, briefing yourself, discussing forecast with other employees, etc.). _____

2. ESTIMATE THE APPOXIMATE TIME SPENT COMPOSING (TYPING/EDITING) PRODUCTS. _____

3. ESTIMATE THE APPROXIMATE TIME SPENT BROADCASTING ON WEATHER RADIO. _____

4. ESTIMATE THE APPROXIMATE TIME SPENT ON EXTERNAL COORDINATION (TELEPHONE AND/OR SFD). _____

5. ESTIMATE THE TIME SPENT ON QUALITY CONTROL. _____

6. ESTIMATE THE TIME SPENT ON THE MANAGEMENT OF OFFICE SYSTEMS (AFOS, ABT, PHONE LINES, WX WIRE, NWR, SWIS). _____

7. ESTIMATE THE TIME SPENT ON PHONE CALLS (EXCLUDING NWS COORDINATION CALLS). _____

8. LIST ANY OTHER SIGNIFICANT TIME SPENT DOING OTHER DUTIES YOU FEEL IS WORTH MENTIONING. _____

LIST THOSE OTHER DUTIES:

IN MOST CASES THE TOTAL TIME LISTED SHOULD BE LESS THAN 8 HOURS BECAUSE SOME TIME WILL BE SPENT EATING, DRINKING, TAKING BREAKS, RADING JOURNALS, ETC.

Figure 1. Time utilization survey. Over 1,000 responses were returned.

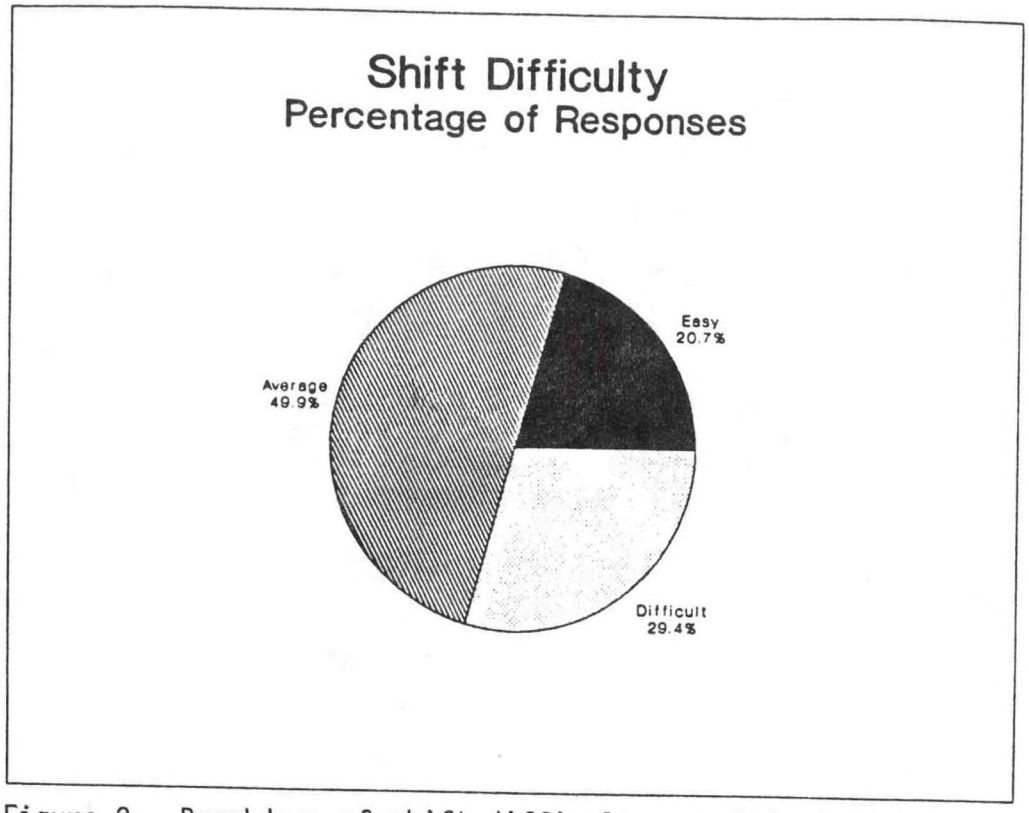

Figure 2. Breakdown of shift difficulty, as judged by forecasters who responded to the time utilization survey.

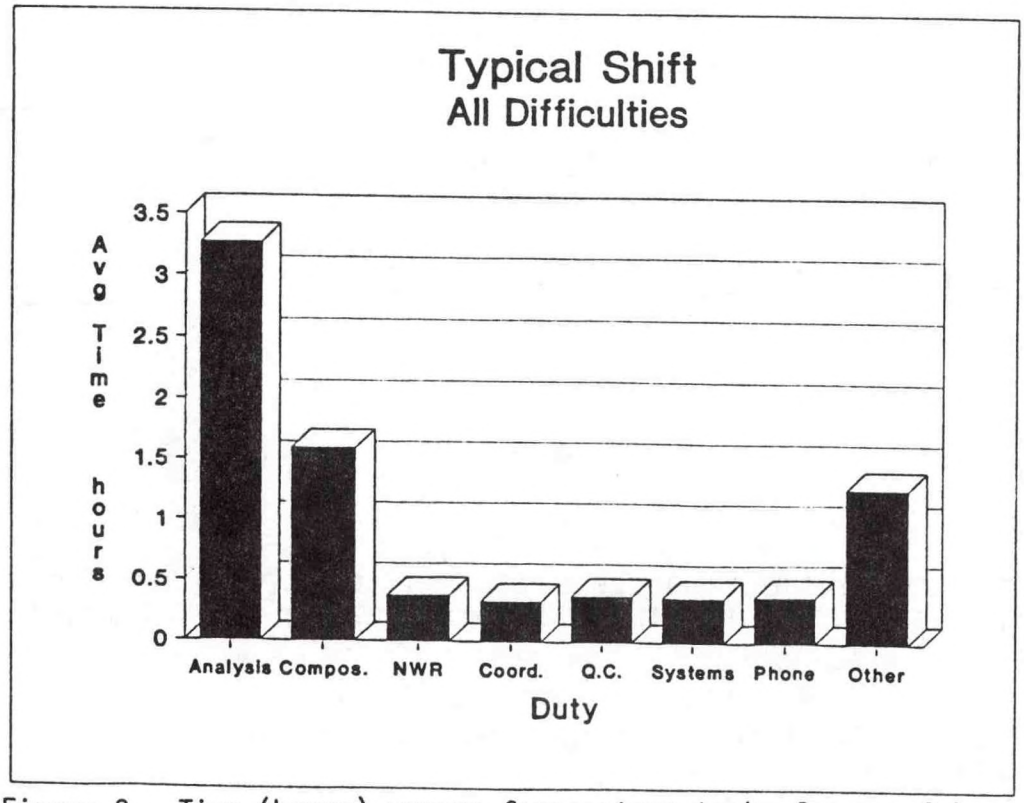

Figure 3. Time (hours) versus forecasters tasks for any 8 hour shift.

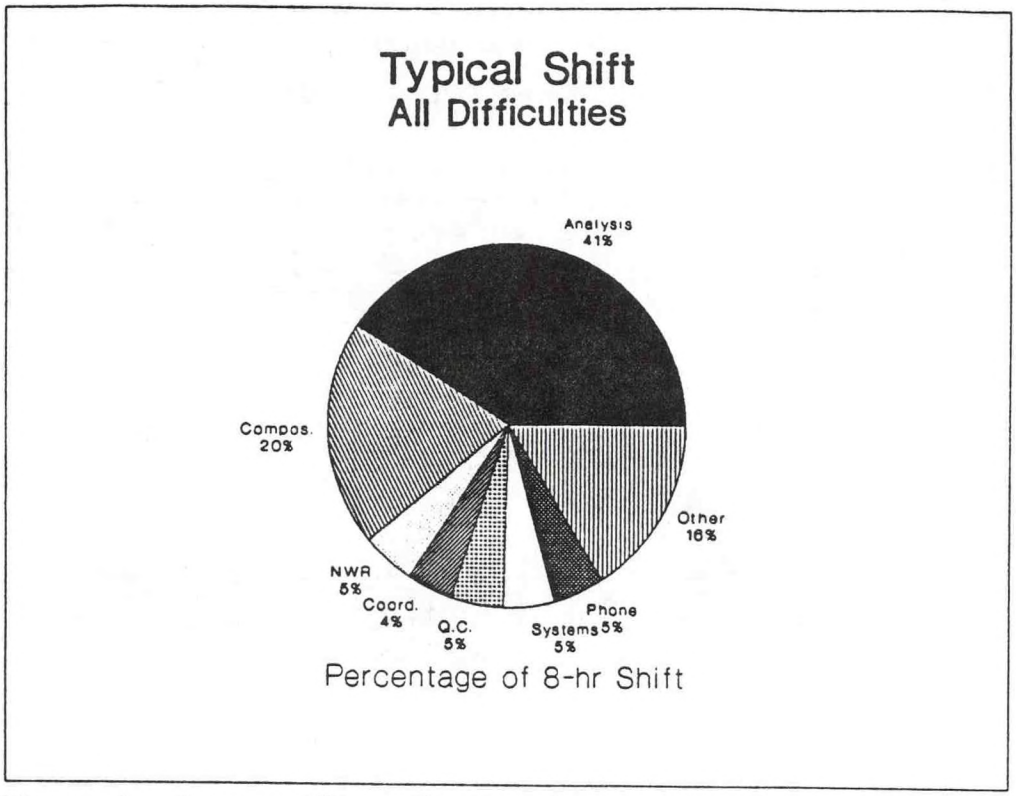

Figure 4. Same as Figure 3, except as a percentage.

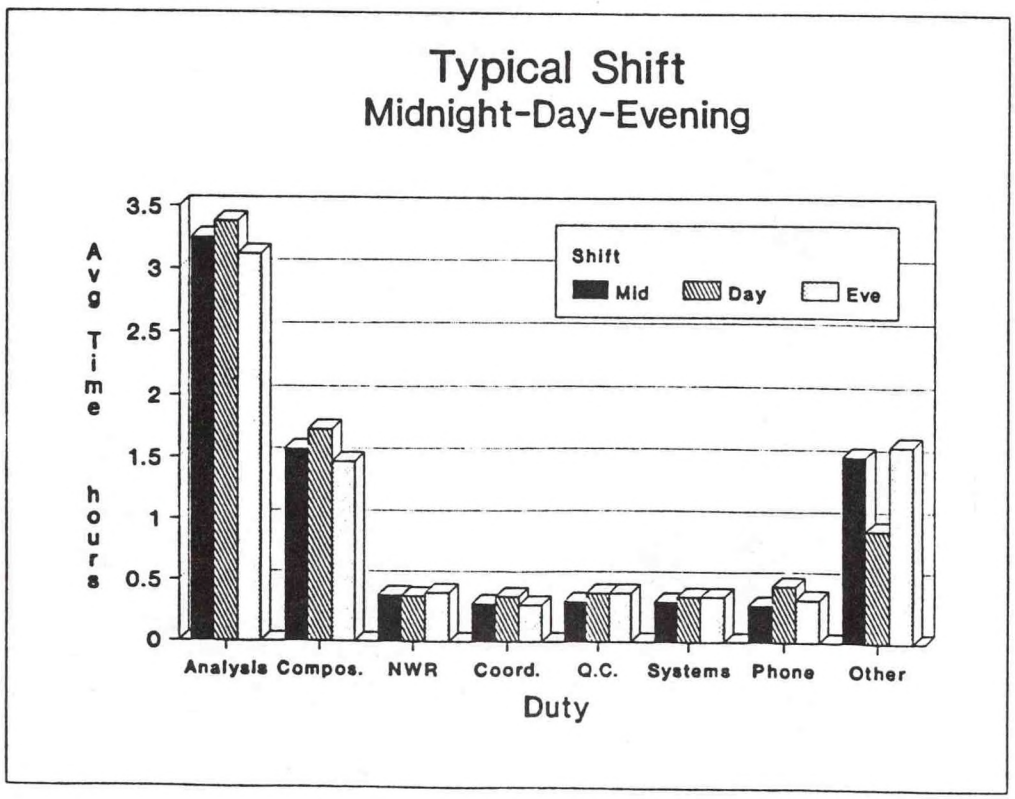

Figure 5. Time (hours) versus duties for midnight, day, and evening shifts (all difficulties).

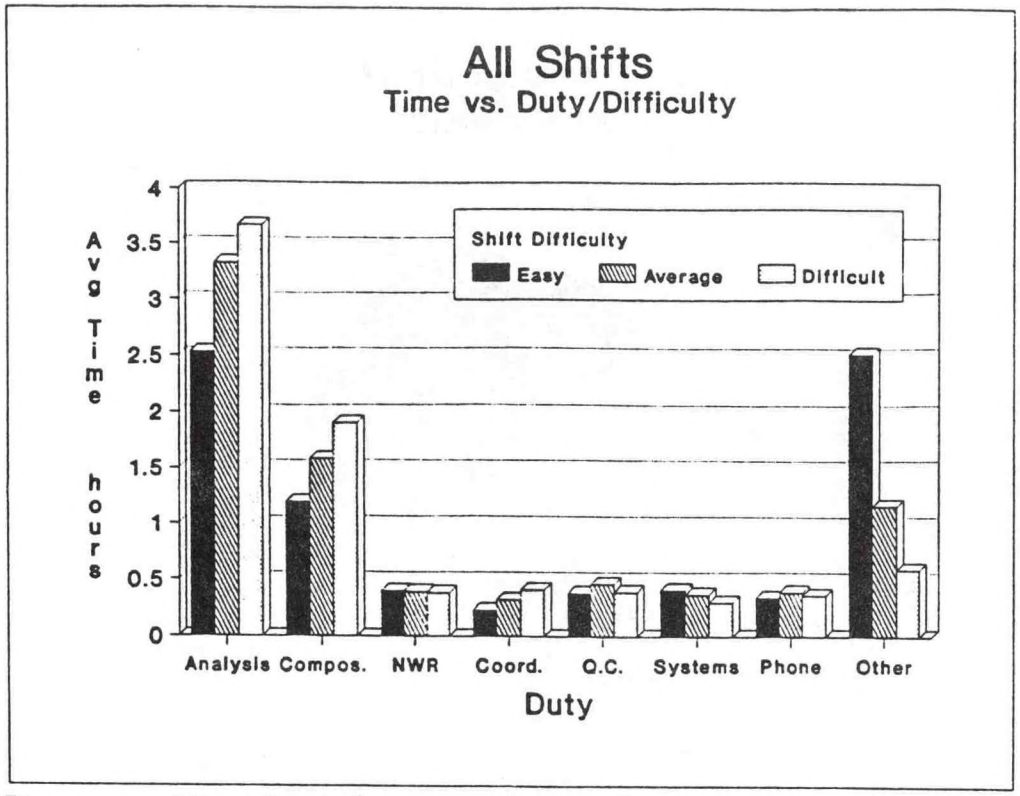

Figure 6. Time (hours) versus duties for easy, average, and difficult shifts (all work hours).

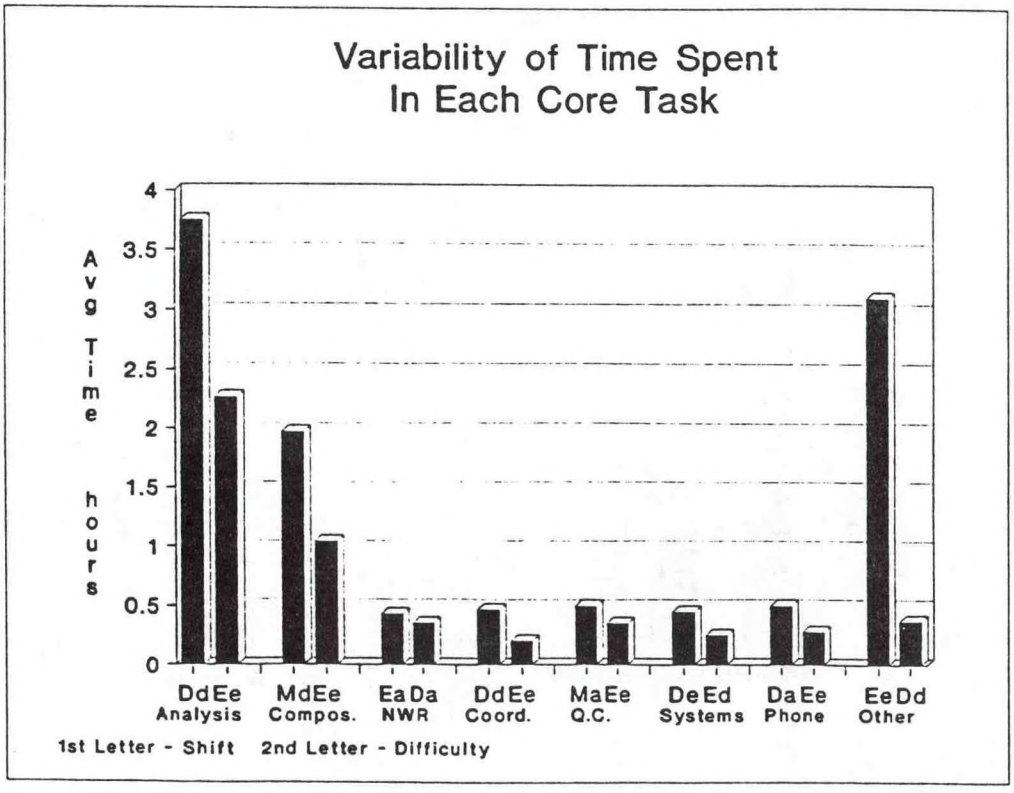

Figure 7. Extremes in average times of tasks. The first line on the x-axis is the shift (first capital letter: D-Day, E-Evening, M-Midnight) and difficulty (second letter: e=easy, a=average, d=difficult).

The variability of time spent in each task is presented in Figure 7. Time spent on analysis ranged from 3 hours, 45 minutes during a difficult day shift ("Dd"), to 2 hours, 15 minutes on an easy evening ("Ee") -- a difference of 1 hour, 30 minutes. During a difficult shift, a forecaster would likely spend a great deal of time examining the numerical models, comparing model performance, plotting surface charts, etc., and spend less time doing other tasks. As a matter of fact, as shown in Figure 7, a difficult day shift produced the least amount of time performing "other" duties.

Message composition varied by nearly 1 hour between a difficult midnight ("Md") and an easy evening shift ("Ee"). This, too, is not very surprising. During the evening shift, updates to the forecast are generally only made to the first period, due to the lack of new guidance at the time of the forecast issuance.

Figure 8 shows two pie charts that depict time spent on each task as a percentage of an eight hour shift for easy and difficult shifts. The most variable was time spent on "other duties." It decreased 25 percent with increased difficulty, while time spent on analysis and composition increased 23 percent.

4. Limitations of the Study

The study did not account for the amount of time that extra day shift employees spent helping the shift forecaster during a difficult weather day. More importantly, the survey was conducted during the winter and did not account for any convective severe weather situations. These circumstances would impact the time spent on NWR broadcasting the greatest (at those offices which require forecasters to do NWR).

The data for the core tasks categories were biased in that WSFO's with no weather radio broadcast responsibility had the opportunity to spend more time in other core task categories. Time spent on NWR in this study included only those forecast shifts which had routine NWR duties.

The study did not distinguish between aviation and public shift responsibilities nor variations in WSFO programs (e.g., marine, fire weather, etc.). Finally, the "other duties" category included time that was unaccounted for in the surveys (i.e., in those surveys that were returned with less than an eight hour total, the "other" category was increased to reach eight hours).

5. Conclusions

The results quantified what many forecasters already knew. Analysis accounts for one-third to nearly one-half of the time spent on shift. This is followed by forecast composition which accounts for 15 to 25 percent of the time spent on shift. These two tasks are routinely the most variable of all core tasks assigned to a forecast shift. As forecast difficulty increases, time spent on analysis and forecast composition will increase substantially and cuts

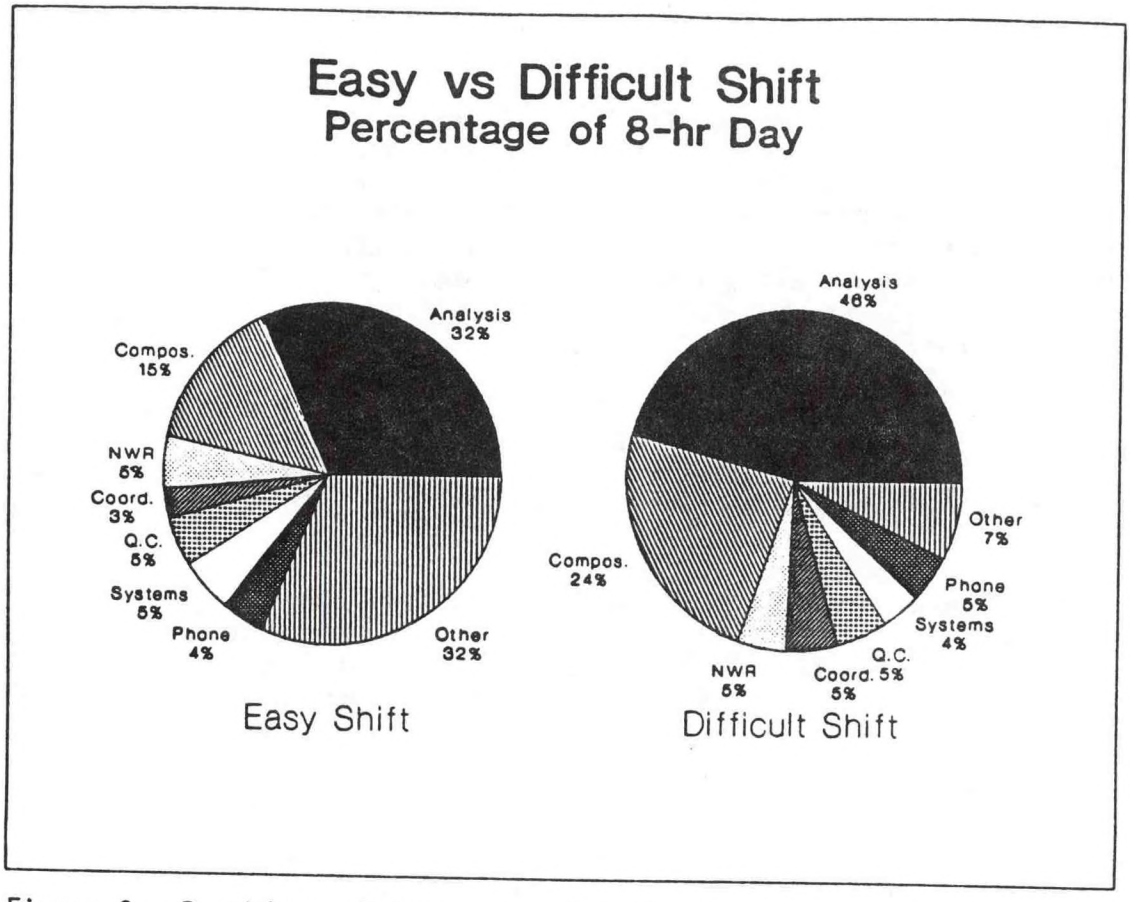

Figure 8. Breakdown of forecasters' tasks during an easy and difficult shift.

first into time spent on "other duties." Time spent on coordination only minimally rises. Time spent on quality control, management of computer systems, and personal phone discussions will eventually decline at the expense of forecast analysis and composition during difficult forecast shifts.

These results focus the challenge of new computer systems into three main points: (1) as the amount of data available to the forecaster continues increase in the future, it is imperative that future computer systems streamline and tailor the analysis process for specific weather scenarios to limit the amount of time spent on this core task; (2) with increased demand for more products from our field offices, new computer systems must find a better process than basic typing to limit the amount of time spent to produce a forecast product; and (3) new computer systems must be extremely reliable.

6. Acknowledgments

The authors would like to thank the Central Region forecasters who took the survey seriously and took the time to fill it out.