MODELING IN THE REAL WORLD Forecasting at Tupperware International

Defining the Problem

To drive production at each of Tupperware's 15 plants in the United States, Latin America, Africa, Europe, and Asia, the firm needs accurate forecasts of demand for its products.

Developing a Model

A variety of statistical models are used, including moving averages, exponential smoothing, and regression analysis. Qualitative analysis is also employed in the process.

Acquiring Input Data

At world headquarters in Orlando, Florida, huge databases are maintained that map the sales of each product, the test market results of each new product (since 20% of the firm's sales come from products less than 2 years old), and where each product falls in its own life cycle.

Developing a Solution

Each of Tupperware's 50 profit centers worldwide develops computerized monthly, quarterly, and 12-month sales projections. These are aggregated by region and then globally.

Testing the Solution

Reviews of these forecasts take place in sales, marketing, finance, and production departments.

Analyzing the Results

Participating managers analyze forecasts with Tupperware's version of a "jury of executive opinion."

Implementing the Results

Forecasts are used to schedule materials, equipment, and personnel at each plant.

Source: Interviews by the authors with Tupperware executives.

The naïve forecast for the next period is the actual value observed in the current period.

the previous month. Table 5.1 gives these forecasts as well as the absolute value of the errors. In forecasting for the next time period (month 11), the forecast would be 190. Notice that there is no error computed for month 1 since there was no forecast for this month, and there is no error for month 11 since the actual value of this is not yet known. Thus, the number of errors (n) is 9.

From this, we see the following:

$$\text{MAD} = \frac{\Sigma|\text{forecast error}|}{n} = \frac{160}{9} = 17.8$$

This means that on the average, each forecast missed the actual value by 17.8 units.

Other measures of the accuracy of historical errors in forecasting are sometimes used besides the MAD. One of the most common is the **mean squared error (MSE)**, which is the average of the squared errors:*

$$\text{MSE} = \frac{\Sigma(\text{error})^2}{n} \tag{5-2}$$

*In regression analysis, the MSE formula is usually adjusted to provide an unbiased estimator of the error variance. Throughout this chapter, we will use the formula provided here.