CASE: PERFORMANCE LAWN EQUIPMENT

In each chapter of this book, we use a database for a fictitious company, Performance Lawn Equipment (PLE), within a case exercise for applying the tools and techniques introduced in the chapter.33 To put the database in perspective, we first provide some background about the company, so that the applications of business analytic tools will be more meaningful.

The case scenario was based on Gateway Estate Lawn Equipment Co. Case Study, used for the 1997 Malcolm Baldrige National Quality Award Examiner Training course. This material is in the public domain. The database, however, was developed by the author.

PLE, headquartered in St. Louis, Missouri, is a privately owned designer and producer of traditional lawn mowers used by homeowners. In the past 10 years, PLE has added another key product, a medium-size diesel power lawn tractor with front and rear power takeoffs, Class I three-point hitches, four-wheel drive, power steering, and full hydraulics. This equipment is built primarily for a niche market consisting of large estates, including golf and country clubs, resorts, private estates, city parks, large commercial complexes, lawn care service providers, private homeowners with five or more acres, and government (federal, state, and local) parks, building complexes, and military bases. PLE provides most of the products to dealerships, which, in turn, sell directly to end users. PLE employs 1,660 people worldwide. About half the workforce is based in St. Louis; the remainder is split among their manufacturing plants.

In the United States, the focus of sales is on the eastern seaboard, California, the Southeast, and the south central states, which have the greatest concentration of customers. Outside the United States, PLE's sales include a European market, a growing South American market, and developing markets in the Pacific Rim and China. The market is cyclical, but the different products and regions balance some of this, with just less than 30% of total sales in the spring and summer (in the United States), about 25% in the fall, and about 20% in the winter. Annual sales are approximately $180 million.

Both end users and dealers have been established as important customers for PLE. Collection and analysis of end-user data showed that satisfaction with the products depends on high quality, easy attachment/dismount of implements, low maintenance, price value, and service. For dealers, key requirements are high quality, parts and feature availability, rapid restock, discounts, and timeliness of support.

PLE has several key suppliers: Mitsitsiu, Inc., the sole source of all diesel engines; LANTO Axles, Inc., which provides tractor axles; Schorst Fabrication, which provides subassemblies; Cuberillo, Inc, supplier of transmissions; and Specialty Machining, Inc., a supplier of precision machine parts.

To help manage the company, PLE managers have developed a "balanced scorecard" of measures. These data, which are summarized shortly, are stored in the form of a Microsoft Excel workbook (Performance Lawn Equipment) accompanying this book. The database contains various measures captured on a monthly or quarterly basis and used by various managers to evaluate business

performance. Data for each of the key measures are stored in a separate worksheet. A summary of these worksheets is given next:

- **Dealer Satisfaction**, measured on a scale of 1–5 (1 = poor, 2 = less than average, 3 = average, 4 = above average, and 5 = excellent). Each year, dealers in each region are surveyed about their overall satisfaction with PLE. The worksheet contains summary data from surveys for the past 5 years.
- **End-User Satisfaction**, measured on the same scale as dealers. Each year, 100 users from each region are surveyed. The worksheet contains summary data for the past 5 years. 2014 Customer Survey, results from a survey for customer ratings of specific attributes of PLE tractors: quality, ease of use, price, and service on the same 1–5 scale. This sheet contains 200 observations of customer ratings.
- **Complaints**, which shows the number of complaints registered by all customers each month in each of PLE's five regions (North America, South America, Europe, the Pacific, and China).
- **Mower Unit Sales and Tractor Unit Sales**, which provide sales by product by region on a monthly basis. Unit sales for each region are aggregated to obtain world sales figures.
- **Industry Mower Total Sales** and Industry Tractor Total Sales, which list the number of units sold by all producers by region.
- **Unit Production Costs**, which provides monthly accounting estimates of the variable cost per unit for manufacturing tractors and mowers over the past 5 years.
- **Operating and Interest Expenses**, which provides monthly administrative, depreciation, and interest expenses at the corporate level.
- **On-Time Delivery**, which provides the number of deliveries made each month from each of PLE's major suppliers, number on time, and the percent on time.
- **Defects after Delivery**, which shows the number of defects in supplier-provided material found in all shipments received from suppliers.
- **Time to Pay Suppliers**, which provides measurements in days from the time the invoice is received until payment is sent.
- **Response Time**, which gives samples of the times taken by PLE customer-service personnel to respond to service calls by quarter over the past 2 years.
- **Employee Satisfaction**, which provides data for the past 4 years of internal surveys of employees to determine their overall satisfaction with their jobs, using the same scale used for customers. Employees are surveyed quarterly, and results are stratified by employee category: design and production, managerial, and sales/administrative support.

In addition to these business measures, the PLE database contains worksheets with data from special studies:

- **Engines**, which lists 50 samples of the time required to produce a lawn-mower blade using a new technology.
- **Transmission Costs**, which provides the results of 30 samples each for the current process used to produce tractor transmissions and two proposed new processes.

- **Blade Weight**, which provides samples of mower-blade weights to evaluate the consistency of the production process.
- **Mower Test**, which lists test results of mower functional performance after assembly for 30 samples of 100 units each.
- **Employee Retention,** data from a study of employee duration (length of hire) with PLE. The 40 subjects were identified by reviewing hires from 10 years prior and identifying those who were involved in managerial positions (either hired into management or promoted into management) at some time in this 10-year period.
- **Shipping Cost**, which gives the unit shipping cost for mowers and tractors from existing and proposed plants for a supply-chain-design study.
- **Fixed Cost**, which lists the fixed cost to expand existing plants or build new facilities, also as part of the supply-chain-design study.
- **Purchasing Survey**, which provides data obtained from a third-party survey of purchasing managers of customers of Performance Lawn Care.

Elizabeth Burke has recently joined the PLE management team to oversee production operations. She has reviewed the types of data that the company collects and has assigned you the responsibility to be her chief analyst in the coming weeks. To prepare for this task, you have decided to review each worksheet and determine whether the data were gathered from internal sources, external sources, or have been generated from special studies. Also, you need to know whether the measures are categorical, ordinal, interval, or ratio. Prepare a report summarizing the characteristics of the metrics used in each worksheet.

ASSIGNMENT   1

Elizabeth Burke has asked you to do some preliminary analysis of the data in the *Performance Lawn Equipment* database. First, she would like you to edit the worksheets *Dealer Satisfaction* and *End-User Satisfaction* to display the total number of responses to each level of the survey scale across all regions for each year. Second, she wants a count of the number of failures in the worksheet *Mower Test*. Next, Elizabeth has provided you with prices for PLE products for the past 5 years:

Year	Mower Price ($)	Tractor Price ($)
2010	150	3,250
2011	175	3,400
2012	180	3,600
2013	185	3,700
2014	190	3,800

Create a new worksheet in the database to compute gross revenues by month and region, as well as worldwide totals, for each product using the data in *Mower Unit Sales and Tractor Unit Sales.* Finally, she wants to know the market share for each product and region based on the PLE and industry sales data in the database. Create and save these calculations in a new worksheet. Summarize all your findings in a report to Ms. Burke.