

Casey Hardware Stores Scenario

Casey Hardware Stores is considering a location for a new store. Examining the profitability of its 20 stores for last year is a step that will help them make this decision. Leadership has decided to use linear regression analysis methods to determine if a linear correlation exists between the profits of its stores and the sales volume of its stores. It is hoped that this information and additional analyses will inform a decision on where to locate a future store.

Part A:

The management team initially wants to use Excel Linear Regression Analysis to take the data for the 20 stores that is in Table 1 to develop a best fit linear equation of the form:

$$Y = a + b X_1$$

where Y is the profit and X₁ is the sales level. They are interested in seeing if there is a relationship between the profit and the sales levels of their 20 stores. Table 1 is a summary of Casey Hardware stores' performance, profits versus sales.

Table 1. Summary of Casey Hardware Stores' Performance Profits Versus Sales

Store #	Profits (\$000s)	Sales (\$000s)
1	42.13	748.82
2	6.32	140.78
3	38.47	702.11
4	-0.32	41.54
5	3.65	96.85
6	7.77	166.93
7	4.31	109.05
8	4.53	263.92
9	-2.69	50.84
10	3.22	90.08
11	9.03	190.59
12	-2.59	91.75
13	6.39	141.57
14	24.39	377.04
15	13.93	198.69
16	2.13	62.78
17	17.48	265.28
18	7.21	91.8
19	15.62	231.6
20	33.61	548.31

Part B:

The management team thinks that the simple analysis completed in Part A is a good start—but they decide that there are several other variables that they would like to consider in this regression analysis.

The company currently has three alternative sites for the store under examination and is trying to assess the likely profitability of opening a store on each site. Management wants to consider the following additional explanatory variables that it feels might logically affect profit. These include:

- The size of each store, X_2 , measured in thousands of square feet. The larger the store, other things being equal, the more customers and the more profit Casey management might reasonably expect.
- The number of different product lines carried by the store, X_3 . The more product lines carried, the more popular the store is likely to be with customers.
- The distance from the nearest major competitor measured in miles, X_4 .

Casey Hardware wants to develop a multiple regression using the data in Table 2 and then recommend one of the three locations to open this year based on the results of that regression analysis.

Table 2. Summary of Casey Stores Performance Versus Sales, Size, Lines, and Distance From Nearest Competitor.

Store #	Profits (\$000s)	Sales (\$000s)	Size (000s sq ft)	Lines	Distance (mi)
1	42.13	748.82	6.0	150	0.1
2	6.32	140.78	1.4	75	0.1
3	38.47	702.11	5.0	170	0.5
4	-0.32	41.54	1.0	75	0.0
5	3.65	96.85	1.2	75	0.2
6	7.77	166.93	1.5	75	0.5
7	4.31	109.05	1.3	75	0.3
8	4.53	263.92	1.1	80	0.4
9	-2.69	50.84	1.1	75	0.0
10	3.22	90.08	1.2	75	0.6
11	9.03	190.59	1.4	80	0.5
12	-2.59	91.75	1.2	75	0.0
13	6.39	141.57	1.4	80	0.3
14	24.39	377.04	3.5	160	1.2
15	13.93	198.69	1.5	100	0.7
16	2.13	62.78	1.3	75	0.1
17	17.48	265.28	2.1	110	0.9
18	7.21	91.8	1.3	85	0.3
19	15.62	231.6	2.5	120	0.9
20	33.61	548.31	4.5	200	0.5

Part C:

Casey Hardware is considering three different sites for a new store. They are constrained in each case as to the size of the store and the number of product lines that they can carry in the store. They plan to use the results of the regression analysis in Part B to select the most profitable site.