Gas Stations: *What I'm Seeing* – August / September 2015

Over the past year I've encountered a number of assignments that required projecting the future operation of a gas station without historical information available. This was typically due to one of the following:

- a vacant station being re-opened
- a new station recently constructed
- a re-brand of an existing station under a different business model
- unavailable operating history

In order to develop a pro forma projection, I needed the help of some dusty old text books. At first the term "linear regression" is enough to cause drowsiness and warnings not to operate machinery. However, if one can keep it simple it is very useful. In essence, a regression model tries to predict an answer (Y) based on various correlated variables (Xn). For example, if Y = sale price, then the X variables might be traffic counts, number of fuel dispensers, etc.

In order to develop a model, the first step is to gather sales data, run a simple correlation matrix to see what variables correlate and then build a regression model with those variables. This can all be done using excel. For example, the table below summarizes the correlation among selected variables that were tested (0 = no correlation and 1 = perfectly correlated). In particular, we're looking for variables that correlate with sale price.

Correlation Matrix

	Traffic Count (ADT)	**C Store SF**	**Deli**	Car Wash	**Traffic Signal**	**Pumps**	**Site Size (SF)**	**Tank Volume (Gallons)**	Daytime Employees	Population 1 mile radius	Median HH Income	Median Home Value	Median Age	Sale Price
Traffic Count (ADT)	1													
C Store SF	-0.4	1												
Deli	-0.2	0.3	1											
Car Wash	0.0	0.2	0.2	1										
Traffic Signal	0.4	0.0	0.0	0.1	1									
Pumps	0.4	0.0	0.0	0.4	0.6	1								
Site Size (SF)	-0.3	0.6	0.3	0.4	-0.1	0.2	1							
Tank Volume (Gallons)	0.2	0.5	0.1	0.2	0.4	0.6	0.6	1						
Daytime Employees	0.6	-0.4	-0.2	0.0	0.5	0.4	-0.3	0.1	1					
Pop.	0.5	-0.4	0.0	-0.2	0.4	0.1	-0.4	-0.2	0.6	1				
Median HH Income	0.2	-0.2	-0.1	0.3	0.1	0.4	0.0	0.0	-0.1	-0.2	1			
Median Home Value	0.1	-0.3	-0.1	0.2	0.2	0.2	-0.2	-0.2	0.2	0.1	0.6	1		
Median Age	-0.2	0.2	0.1	0.0	-0.2	-0.2	-0.4	-0.2	-0.2	-0.3	0.0	0.3	1	
Sale Price	0.1	**0.5**	**0.4**	0.3	**0.6**	**0.6**	**0.5**	**0.6**	0.1	0.0	0.1	0.0	-0.1	1

The next step is to identify the good indicators (**bold above**) and after a few clicks of the mouse you have a regression model. You know you're on the right track if the model produces a high R-squared value (how well the variables predict the answer ranging from 0 = no explanation to 1 = perfect explanation). Lastly, you'll want to experiment with different combinations of variables to try and improve the accurateness of the model.

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So at this point one might be thinking: How is this "model" actually used? Well, let's consider a buyer looking at a potential gas station to purchase. Given the most recent sales in the market, what might this station sell for?

Consider that this gas station has the following characteristics:

- Traffic count (ADT): 15,000 cars per day
- C-Store Size: 1,800 SF
- Deli (Yes=1/No=0): No (0)
- Traffic Signal (Yes=1/No=0): Yes (1)
- Gas Pumps: 4 dispensers
- Site Size: 20,000 SF
- Tank Volume: 24,000 gallons

Plugging these numbers into the model, the suggested value of the gas station is:

Regression Model				
R Squared = 0.8	*Coefficients*	*x*	*Subject*	*= Value*
Intercept	$37,055			$37,055
Traffic Count (ADT)	-$5.24		15,000	-$78,610
C Store SF	$205		1,800	$369,465
Deli	$670,725		0	$0
Traffic Signal	$754,700		1	$754,700
Pumps	$162,836		4	$651,342
Site Size (SF)	$4.31		20,000	$86,150
Tank Volume (Gallons)	-$1.42		24,000	-$34,086
Estimated Value				$1,786,015
Rounded				**$1,790,000**

The R Squared value (how well the model predicts) is 0.8, which is respectable. However, I suspect that additional variables (monthly gallons, in-store sales, additional profit centers, etc.) might create a better model. But going back to the original problem, what if you don't know that info? Well, other models could be developed that predicted gallons, fuel and store revenue and then these could be utilized in a value model. The applications are endless, but all offer the opportunity to explore, learn something new and help solve a problem.

Thanks for reading and please call anytime if I can help solve a valuation problem in Oregon or Washington:

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