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PROJECT #2

ISDS 526: *Forecasting for Analytical Decision Making*

Disclaimer: This case study has been modified by Dawit Zerom to fit the purpose of this course.
To Students: Please **do not post** this material or your final report on any public venue such as the internet. I spend a lot of time and effort to make the course relevant to your future analytics career. Once posted online, my assignments would no longer have any value as a learning material.

Titanium Brewery

Titanium Brewery was located in the southern Caribbean Island of Trinidad. Since its foundation in 1924, the company has established an excellent reputation. Titan beer had become a favorite with tourists, and as a result, a modest export business to the United States had started in 2000. In February 2004, sales reached the highest level in the company's history. However, in 2003, the sales increase had been well below the trend average (please confirm this by carefully studying the data). Four sales peak occurred during the year: Carnival[1], Christmas, Easter and Independence[2]. Carnival was the highest sales period but each peak caused the company to operate on tight schedules and Titanium hired more labor and scheduled extra shifts

The issue

It is now early 2004. David Keating, purchasing manager at Titanium Brewery, was trying to determine how many bottles to purchase in the coming year. On the one hand, he wants to be sure sufficient bottles are available to supply 2004 sales levels, yet also want to minimize year-end inventories of bottles. Covered storage space for empty bottles is tight, and a bottle design change

[1] Carnival took place two days before Ash Wednesday, which normally occurred during February or occasionally in early march.
[2] Trinidad gained independence from Britain on August 31, 1962.

seems possible in 2005 and 2006. In short, because either under-forecasting or over-forecasting (sales) are both costly situations, Keating needs to have a good basis before making his bottle purchase decision.

Data

Monthly beer sales January 1999 to February 2004 (in thousands of cases) are given below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1999	211	338	191	192	138	148	205	244	164	200	205	229	2465
2000	244	403	213	244	153	195	231	327	337	247	234	438	3266
2001	291	386	335	278	159	209	205	364	263	280	282	273	3325
2002	323	478	327	327	211	342	288	374	304	337	304	357	3972
2003	328	512	310	346	261	296	394	331	305	305	321	369	4078
2004	342	535											

You need to convert to appropriate format to use Forecast Pro XE.

The Assignment

Prepare a professional forecasting report. There are no page limits. Use the following table of contents (in that order) to discuss your findings. (See the Banged-Tail case report (Chapter 1 Lecture Document) for some pointers).

1. **Executive summary / Recommendation**: prepare an executive memo that summarizes (should be clear to a lay person) your findings and analysis. In the memo, roughly indicate how your accuracy measure (MAPE value) for the holdout period and the forecast intervals of the forecast period may be used in the bottle purchase decision that Titanium Brewery faces.

2. **The Forecasting Problem Set-up**: Within the context of the case, define the forecasting problem. Provide a graphical framework (with discussion) how decision making is related to forecasting. Clearly specify the goal and the decision.

3. **Examination of Data Patterns**: Using visual inspection of the data as well as autocorrelation analysis, examine the time series patterns of the data. Your examination should at least address the following issues: trend, and seasonality. Also conduct differencing analysis (simple and/or seasonal as required) to help you better understand the correlogram. Make sure to append your time series plot and correlogram, and both figures should be appropriately referenced and discussed.

4. **<u>Model Selection / Holdout Analysis</u>:** Guided by your analysis in 3) and using **holdout period**: June 2003 – Feb 2004, select the best forecasting method (**ONLY from the class of exponential smoothing models**). Do not use Expert Selection or any other method than exponential family. Make sure that you use the ***static holdout analysis*** (not the rolling evaluation). In your report, you have to summarize your forecast accuracy comparisons (of the models you have considered) in a table form. **Use only MAPE in measuring accuracy**. You have **to appropriately discuss** your analysis. Your report should also provide and interpret the seasonal indexes.

5. **<u>The Forecast</u>**: Using the best model in 4), predict sales for the rest of 2004. Include your monthly forecast values, annual/yearly forecast for 2004 as well as the upper and lower confidence limits at, say 95% confidence level. Indicate how your MAPE for the holdout period as well as the confidence intervals for the forecast period can help Keating in his bottle purchase decision. You might also look at other confidence levels to further refine your recommendations.