**Statistical Programming Assignment 2 (MKTG 664):**
**Using SPSS for Reliability and Factor Analysis**

**Topic:** Using R and SPSS for Reliability and Factor Analysis

This assignment allows you to get started using SPPS to fit statistical models. As discussed in class, SPSS is very user-friendly and somewhat robust (especially with the AMOS add-on) software for several statistical analysis types.

For this assignment, you want to follow the steps outlined in three videos that I'll reference and link through this assignment document. The videos will (1) introduce you to the SPSS interface, (2) show you how you can use SPSS (with a minor assist from Excel) to calculate two different estimates of scale reliability (the Cronbach (1951) alpha and the Fornell and Larcker (1981) composite reliability), and (3) demonstrate how SPSS can be used to conduct an exploratory factor analysis. For a reference on the steps and interpretation of factor analysis, see Hair (2019).

You will submit a pdf document summarizing your work for your assignment.

First, if you are unfamiliar with SPSS, you can watch a 10-minute video as an introduction. While watching videos, I encourage you to open your software version and follow along where appropriate to enrich your learning. You can find a 10-minute introductory video by Prof. Jeff Galak at: https://tinyurl.com/MKTG664introSPSS.

Second, you'll need to secure the **two datasets** you'll be using for this assignment's reliability and factor analysis portions. The **first dataset** is the one used in the videos used to demonstrate how to use SPSS to calculate Cronbach's (1951) alpha, which is the same dataset for the factor analysis demonstration. That dataset can be found in the links provided on YouTube by Prof. Galak. You should then be able to follow the video's instructions to obtain key factor analysis results. That data is the **Data Demystified YouTube Survey (hereafter the B5P_YouTube** data**)**, including items from the Big 5 Personality Traits. See the Wikipedia link for background information: https://en.wikipedia.org/wiki/Big_Five_personality_traits.

Third, for the assignment, you'll be reporting your analysis from a dataset that does not have pre-established solutions, as it is data taken from 43 of my previous students on their Big 5 Personality Traits. That data file is named: **B5P_S12** data (from the assignment folder on the course website). These student data may or may not have any factorability or meaningful structure. That's what you seek to discover 😊.

To conduct an **Exploratory Factor Analysis** using SPSS on both datasets, follow the steps summarized/demonstrated in this 12-minute video: https://www.youtube.com/watch?v=8uVEEGeg45s

To calculate **Cronbach's alpha reliability estimates using SPSS** on both datasets, follow the instructions provided in this 4-minute video: https://tinyurl.com/KTG664CronAlpha

To calculate the **Fornell and Larcker reliability estimates using SPSS and Excel** on both datasets, follow the instructions provided in this 11-minute video: https://tinyurl.com/MKTG664FLRelSPSS

Your assignment submission should summarize your output, and you can copy and paste (or simple screen captures) along with explanatory comments into a Word document that you can export or save as a PDF document when finished. Submit your PDF document into the assignment folder. For grading, your assignment should demonstrate the following:

**A) Factor analysis results for B5P_YouTube (1 pts):** This should mostly replicate the demonstration video. Capture (screen capture or copy and paste from your output) and briefly EXPLAIN the key results from SPSS. Your report should include:
(1) the KMO and Bartlett's Test for factorability of the data, (2) an item assessment using the anti-image correlation measures of sampling adequacy, (3) a table of total variance explained from your Principal Components Analysis output table along with your interpretation of the number of factors suggested by the eigenvalues, (4) scree plot, (5) the rotated component matrix, (6) a screen capture of your re-naming the numbered factors produced by SPSS, (7) the output of your test of how well the factor solution works by correlating the factors produced in your factor analysis with the original scale measures, (8) a copy of the factor scores table). For each of the key outputs, you should provide your interpretation of each key output. When completed, your document should include screen/copy and paste captures of the SPSS output and explanations. This will likely be in a Word file that you'll then convert to a PDF for assignment submission.

**B) Factor analysis results for B5P_S12 (2 pts):** This portion of the assignment should follow the steps you completed in the demonstration video. These data may not be factorable. If not, note that using the appropriate statistics. If these data are factorable, conduct and report the results of your analysis with each of the reports above. Briefly explain how you feel those items are working/not working according to their intended factor (e.g., the BFI 2 facet on the Survey Coding Scheme).

**C) Reliability and discriminant validity estimates (1 pts)**: Show that you understand how to use SPPS to calculate **both** Cronbach's alpha and Fornell & Larcker's (1981) composite reliability estimates for the factors you produced using the **two datasets**. Also compare the average variance extracted (AVE) within each pair of dimensions with the square of bivariate correlations between those two dimensions. Include a copy of your output from your calculations for both datasets.

**D) Using R for the initial setup of a Factor Analysis (1pt): A taste of Factor Analysis R:**
Demonstrate that you can use R to conduct the early stages of a Factor Analysis, namely an assessment of the factorability of the B5P_S12 data. Here, you only need to test the factorability of the data. Provide evidence of your output and explain whether the KMO and Bartlett Test match the results you obtained using SPSS.

Good luck, and have fun with R, SPSS and Excel!

**References:**

Cronbach, Lee J. (1951), "Coefficient alpha and the internal structure of tests," *Psychometrika*, 16 (3), 297-334.

Fornell, Claes and David F. Larcker (1981), "Evaluating structural equation models with unobservable variables and measurement error," *Journal of Marketing Research*, 18 (1), 39-50.

Hair, Joseph F., Jr. (2019), Multivariate data analysis (Eighth ed.). Andover, Hampshire: Cengage.