Application in Lavaan (R): Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM)

The relationships between: Customer Perceptions and the Likelihood of Future Business

Data source: Hair et al., Multivariate Data Analysis, Pearson Education

Business Problem & Objectives

HBAT is a manufacturer of paper products who sells products to two market segments: the newsprint industry and the magazine industry. The current market is very competitive, so the manufacturer wants to understand how its customers perceive the company and make purchasing decisions, in order to enforce customers loyalty.

The manufacturer commissioned a study asking its customers to complete *a questionnaire* on a secure website. In total, 100 customers - purchasing managers from different firms - buying from HBAT completed the questionnaire. The data consist of three main pieces of information:

- A 1st type of information is available from HBAT´s data warehouse and includes information on:
  - customer type in terms of length of purchase relationship (X1)
  - industry type(X2)
  - size of the customer(X3)
  - region of the customer(X4)
  - distribution system(X5)

- The 2nd type of information is collected based on the online questionnaire and includes consumers' perceptions of HBAT´s performance on 13 attributes using a continuous 0-10 (line) scale with 10 being "Excellent" and 0 being "Poor". The 13 attributes are:
  - X6 Product quality
  - X7 E-commerce
  - X8 Technical support
  - X9 Complaint resolution
  - X10 Advertising
  - X11 Product line
  - X12 Salesforce image
  - X13 Competitive pricing
  - X14 Warranty and claims
  - X15 Packaging
  - X16 Order and billing
  - X17 Price flexibility
  - X18 Delivery speed

• The 3rd type of information relates to purchase outcomes and business relationships:
  - satisfaction with HBAT, future purchase intention etc. (X19-X22)
  - whether the firm would consider a strategic alliance/partnership with HBAT (X23).

Data

The dataset (*HBAT.sav*) consists of data for n = 100 customers. Each observation contains information on 23 variables described above.

The operational tasks are:

Task 1: Set up an Exploratory Factor Analysis (EFA).
Task 2: Set up a Confirmatory Factor Analysis to test the measurement model adjacent to EFA.
Task 3: Set up a SEM model, to test the structural relationships between the constructs identified (in EFA and confirmed in CFA) and the likelihood of future business (measured based on X19-Satisfaction, X20-Likelihood of recommendation and X21-Likelihood of future purchase). The manufacturer wants to understand how its customers' perceptions determine purchasing decisions, in order to enforce customers loyalty.

The analysis is performed using the R package "lavaan".
The R file and dataset are available on Brightspace.