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Assignment: SAS Exploratory Factor Analysis– Team HW November 11, 2017

HATCO Corporation designs, produces and services holding and warming equipment for foodservice applications. It offers products in the areas of Bain Marie heaters, booster water heaters, built-in food warmers, carving stations, chef LED bulbs, cold shelves, commercial toasters, decorative lamps, drawer warmers, food display lights, fry stations, heated display cases/cabinets, heated shelves, heated wells, holding cabinets, hot/cold shelves, hot/cold well solutions, hot food merchandisers, hot water dispenser, light cooking equipment, nacho chip warmers, pizza warmers, portable food warmers, refrigerated wells/frost tops, sink heaters, sneeze guards, and strip heaters. The company sells its products through a sales representative. Hatco Corporation was founded in 1950 and is based in Milwaukee, Wisconsin.

The analysis being done here is a segmentation study for a business-to-business situation, specifically a survey of existing customers of HATCO. The dataset consists of 100 observations on 7 separate variables. The types of information that were collected, is the perception of HATCO on seven attributes identified in past studies as the most influential in the choice of suppliers. The respondents, purchasing managers of firms buying from HATCO, rated HATCO on each attribute.

The seven HATCO attributes rated by each respondent are as follows:

X1 Delivery speed - amount of time it takes to deliver the product once an order has been confirmed
X2 Price level - perceived level of price charged by product suppliers
X3 Price flexibility - perceived willingness of HATCO representatives to negotiate price on all types of purchases
X4 Manufacturer's image - overall image of the manufacturer/supplier
X5 Service - overall level of service necessary for maintaining a satisfactory relationship between supplier and purchaser
X6 Salesforce's image - overall image of the manufacturer's sales force
X7 Product quality - perceived level of quality of a particular product (e.g., performance or yield)

The company’s business had been considered revolutionary in the field of food service equipment. But during the recent past, the company has been facing issues to generate more revenue and increase the product reach.Therefore, the business problem that is being addressed in this analysis is to increase the company’s presence not just in the US, but Worldwide. This would in return help the executives to plan for their future direction for the company.

Since analyzing across seven factors becomes strenuous as the process needs to assess each variable individually and also together. The results generated out of the seven factors would be too much to be consumed by any individual. Therefore, the team conducted an exploratory factor analysis on the dataset in order to reduce the dimensions and conduct further research on the factors that have genuinely effect on the problem statement.

The team used Principal Component Analysis to explore the factors and created a report using SAS software. Principal Component Analysis is a statistical procedure that measures data in terms of principal components

rather than on a normal y-axis. This procedure helps us to do dimension reduction in the dataset. Conducting this analysis, the team was able to minimize the factors responsible for our research.

During this procedure, the team ran analysis using correlation matrix, simple statistics, eigenvalues of the correlation matrix, eigenvectors, scree plot, component scores matrix, component pattern profiles, partial correlations controlling all variables, kaiser's measure of sampling adequacy, factor pattern, variance explained by each factor, orthogonal transformation matrix, rotated factor pattern and final communality estimates.

While there were many statistical measures to assess the factors holistically, but few measures that help a lot are correlation matrix, eigenvalues correlation matrix, eigenvectors, scree plot, kaiser's measure of sampling adequacy, factor pattern and rotated factor pattern.

Using the correlation matrix, the team was able to understand the correlation between different factors and derive that Service, Salesforce's Image, Manufacturer's Image, Delivery Speed and Price level were highly correlated. But this alone does not provide enough evidence to reduce any factors. Then the team looked through eigenvalues and eigenvectors, this provided the information that there were only 3 factors which showed eigenvalues of more than 1. Along with that looking at the Scree plot and Proportion values, there was a clear difference between 3rd and 4th Factor. Therefore we decided on minimum three factors for final assessment.

During the factor analysis of all variables, we could realize that there were multiple factor loadings for certain factors. Also, the loadings for certain variables were not distinct. So we use rotated factor solution i.e. varimax rotation to get the clear picture. So were able to identify variables for variable reduction. After repeating the same factor analysis we deleted variable Service which had the lowest MSA value in all the variables. After finalizing the factors and variables, we computed the F-Scores for each component and with other ones. There were three factors overall, which factor 1 was Department''s image which correlated with manufacturer's image and salesforce's image. Factor 2 was about Department Service where it was matched with Delivery speed and Product Quality. Factor 3 was about Pricing Satisfaction of the services provided which was matched with price flexibility and price levels. This shows that these are the main six variables which would help us conduct further analysis on the business problem.

On completion of the analysis, the conclusion was derived that there were six specific measures that reflected the outcomes of the respondent's purchase relationships with HATCO, which were Delivery Speed, Price Levels, Price Flexibility, Manufacturer's image, Salesforce's image and Product quality. These factors provide a comprehensive correlation over HATCO's business.