**Final Assignment**

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**Final Project**

Inventory is the arguably the most important aspect of a sales business to manage, if you don’t have goods to sell you can’t sell them, but how much excess inventory is too much? Excess inventory, first and foremost, reduces available cash flow for an organization (Gartenstein, 2019). Reduced cash flow can lead requiring loans to cover liabilities and pay interest on that loan, or it can eliminate the ability to take advantage of a capital-requiring opportunity. In recent times, during the uncertainty of the pandemic, reduced cash flow from excess inventory meant the difference between weathering the storm and closing for good (Lazar, 2020). Using machine learning, forecasting sales quantity amounts per item, per location can help give businesses the opportunity to ensure they have enough inventory for upcoming sales, all while reducing excess inventory and the costs associated with that excess.

With the completed exploratory data analysis, it was evident the company could benefit greatly from a machine learning based dynamic inventory system. From the start, it was evident this project was not necessarily designed for an inventory / purchase management perspective, but more so for a survey/response perspective. While this was a basic regression analysis, I feel there are multiple assumptions that must be made when completing a project such as this. The regression analysis does not take into effect the frequency of stock deliveries, bulk discounts received for stocking more items than is necessary or optimizing the number of deliveries to delivery cost ratio, for example. The results of the predictions using the linear regression model were quite clear, however, that the company had some major inventory requirement shortfalls, including stocking far too many of one category of items and far too few of another category of items.

One of the things I struggled most with was fitting a dataset that was completely different from those we used in class to the concepts we learned in this class. There were a lot more categorical columns in my dataset, and that should have thrown some red flags to me in the beginning stages of the project. From my beginning analysis, a significant number of columns had little to no statistically significant effect on the variable(s) I was trying to research, and ultimately, to predict for the future. Another thing I overestimated was the sheer volume of different products, some of which were no longer being sold and some of which had just recently began being sold, which is why I chose to analyze by category for the exploratory analysis phase of research.