For our Product and Production module 4th year module, our project focused on optimising the inventory and production processes for a metaphorical company “Damp Doors”, a company that orders stock material in bulk annually and incurs significant holding and storage costs. Our objective was to reassess the key performance indicators (KPIs) for their product and implement improvements.

I was tasked with detailed analysis of the current stock ordering system, where all stock is purchased at the start of the year, resulting in high annual holding costs due to storage and personnel expenses. I calculated the monthly and annual storage costs by considering the area required for pallets storing the materials and the associated rental costs. To address inefficiencies, a dynamic ordering system was proposed and evaluated that adjusts the frequency of orders throughout the year, aiming to balance holding costs with shipping costs, which include bulk order discounts.

I developed a MATLAB model to simulate different ordering frequencies and calculate the corresponding costs. This model helped in identifying the most cost-effective ordering strategy by comparing the cumulative holding and shipping costs across various scenarios. Safety stock levels were also incorporated to mitigate potential delays, ensuring customer satisfaction by maintaining the readiness of finished products.

The optimisation also extended to the company's maintenance strategies for their production equipment. By moving from a reactionary to a preventative maintenance approach, I aimed to reduce downtime and maintenance costs. I used theoretical constructions combined with random number generation techniques in MATLAB to model potential failures and repair times, which informed our preventative maintenance schedule.

Through analysis, it was realised that a significant reduction in yearly costs, leads to a decrease in the manufacturing cost per product, thus enhancing the overall efficiency.

Skills Employed:

Statistical Analysis and Modeling: Utilized MATLAB for simulating inventory levels and maintenance schedules to identify cost-saving opportunities.

Financial Forecasting: Calculated potential savings and costs associated with different inventory management and maintenance strategies.

Operational Analysis: Examined and optimized logistical operations to improve the efficiency of material handling and storage.

Strategic Planning: Developed strategies for inventory management and preventative maintenance that align with the company’s goals of reducing waste and operational costs.

Presentation and Visualization: Employed Adobe Illustrator and Photoshop to create compelling visuals for presenting our findings and recommendations effectively.