

Team 1 – Bombardier - Executive Summary

This report aims to develop an improved order policy for Q400 aircraft series by examining the current order policy from a quantitative perspective. This project was undertaken by partnering with Bombardier Aerospace Inc., in conjunction with University of Toronto to provide operational insights into Bombardier's order policy management. For a more efficient order policy, a deep-dive data analysis of the data from the past few years must be performed to understand in-depth the various biases in the demands. For the parts that have low demand variability (>80%), the accuracy of the forecast book must be investigated. In addition to this, the scope for the project encompasses looking at how different business units have direct or indirect impact on logistics performance. The Bombardier Q400 has over a thousand active parts in it, accounting for a complex system. With multiple suppliers around the world having different order/shipment times and inventory of few million dollars, a detailed analysis is required to reduce the inventory levels and optimize the order pattern. With Bombardier expecting new customers in the upcoming year and since Q400 is a highly optioned program, there is a significant need to review its order policy and inventory levels due to the unpredictability of demands. There is a significant need to undertake continuous improvement initiatives to optimize inventory levels due to varying demands of parts. Since it is a highly optioned program, every customer may want customization on an aircraft that has never been achieved before. An optimization project that aims at an improved order policy, this project will focus on different material groups and understand the nature of orders and their respective patterns, which will directly impact the inventory levels.

Bombardier Aerospace has multiple bays responsible for the installing optioned features into an aircraft. Each bay has work centres where the materials required to create an option are processed and assembled. The bays also record crucial information that will be useful for monitoring material consumption rates such as the number of issues, the number of retraction, and the price of each item. This information was used in forecasting the reorder point of materials to reduce shortage/excess of materials.

The results of the analysis identified 320 option feature materials with take-rates above 80%, and 2396 materials with take-rates below 80% out of a total of 2716 materials. However, only 97 materials out of the 320 materials with take-rates above 80% were in the forecast kit, which is very low (less than 35%). Also, 214 materials from the 2396 materials with take-rates below 80% were found in the forecast kit, including items with take-rates below 20%. This showed that there were a high number of anomalies, materials that do not follow Bombardier's order policy, in the data provided. Studying the anomalies for trends that can reveal the causal factors yielded no result. Rather, it exposed more anomalies. Materials in the forecast kit had safety stocks assigned to them, which should not be the case according to the order policy. A material had a safety stock of 10, which should not be the case because the maximum safety stock assignable per item is 6, according to the order policy. This may be a result of data disintegration. Any changes made to updating the order policy will further complicate issues if the process is not in statistical control. In order to further analyse the order policy effectively, higher quality of data is needed. Data that has a monthly timeline of the issue rate should be used instead so the process can be observed if it is in statistical control.

Recommendations include the proposal to generate a holistic overview of the inventory system. This involves analysing the past data by following the six-step approach recommended towards the end of report. A second recommendation to Bombardier is to develop a portal (e.g. Tableau) to integrate datasets from each department databases into a master dataset which can be easily interpretable and analysed Utilizing a dashboard, it is easier to track for each department to see how their operations affects the overall business and the inventory. Sales department will be able to compute the loss/gain in the long-term inventory when one of the airline option gets rolled rather than assigning a person to pull data and calculate it manually. Regular meetings should be set up in granular team level and higher levels in hierarchy. This process will improve interdepartmental communication and a combined inventory review could produce results that leads to reduction of inventory and obsolescence.