BRISA Inventory Management Project

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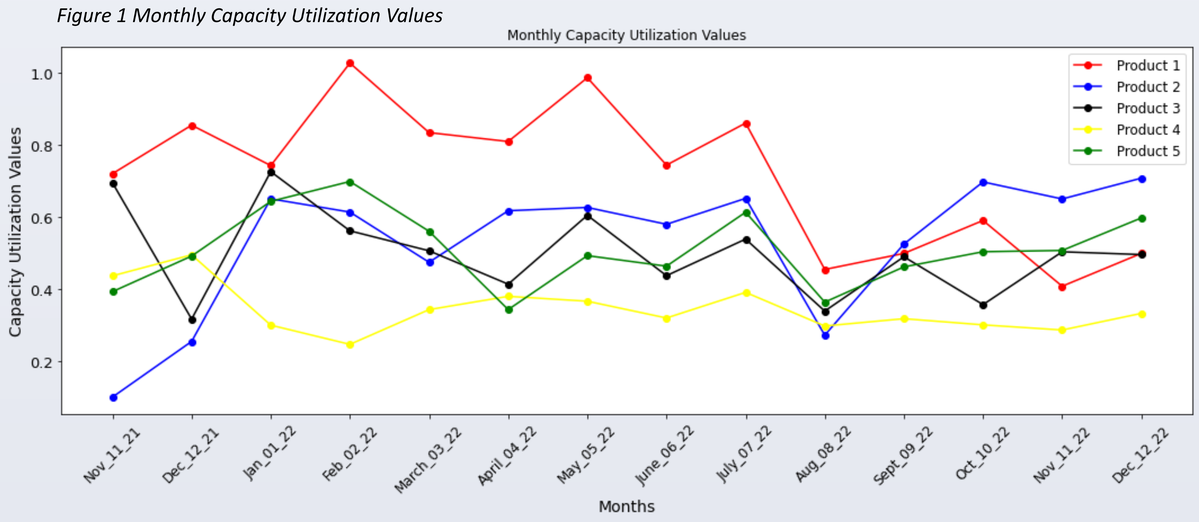
ABSTRACT

The company which we collaborated on this project is Brisa. It is one of the largest tire manufacturers in Turkey. Brisa had an opportunity for stock cost reduction with the help of stock optimization process. Moreover, their inventory levels were not balanced, for some products Brisa was forced to do pre-order, back-order or produce when it was ordered. Our aim in this project was to manage the inventory so that the inventory levels would be much more balanced so that company can meet the orders and the demand on time with less uncertainty. To address the problem, we have created an algorithm. The main steps of the algorithm are shown in Weekly Cover Schedule Algorithm Flowchart. The algorithms are implemented in Python and the results are visualized both in Python and Power BI. The most important findings in our project are the inventory and production policy for the company which can reduce costs while increasing the customer satisfaction.

Figure 1 Monthly Capacity Utilization Values



OBJECTIVES

The main objective of this project is making an inventory and production policy with dynamic weekly cover schedule such that the company can satisfy the demands of the customers on time and have the optimal inventory level.

PROJECT DETAILS

Calculating Weekly Cover (WC) values

The weekly cover is a cover-based policy that identifies how many weeks will be taken for the available inventory level to be used if it is reduced according to the forecasts. This policy calculates the cover time by dividing or subtracting from the available inventory level the forecasted demand for the same unit of time. In order to calculate the weekly cover values, we consider the forecasted values as the actual demand and compare them with the Beginning Inventory (BI) values. For the BI value, we also consider production, forecast, and inventories from the previous month.

Calculating the projected Capacity Utilization (CU) values

Production capacity is calculated based on the multiplication of the number of molds, the daily production rate of a tire, the net working days in the month, and a yield. After calculating the weekly covers, the capacity utilization of each product for each month is calculated by dividing the forecast by production capacity and a graph from these values is made. This approach calculates the proportion of the monthly forecast that can be covered with only the production of that month. In other words, it shows the risk to cover the forecast with production. The CU values for some products can be seen above at Figure 1.

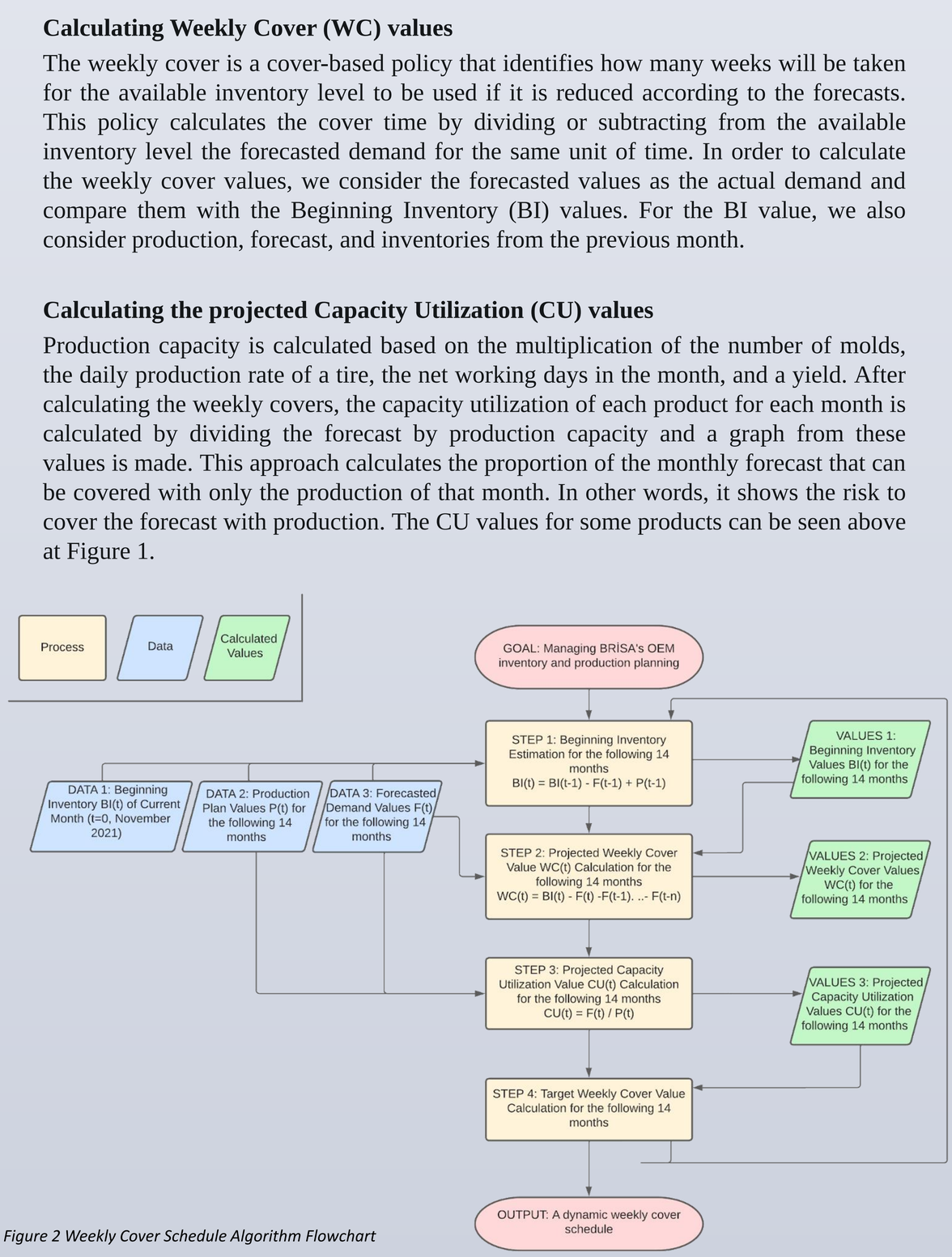


Figure 2 Weekly Cover Schedule Algorithm Flowchart

PROJECT DETAILS CONT'D

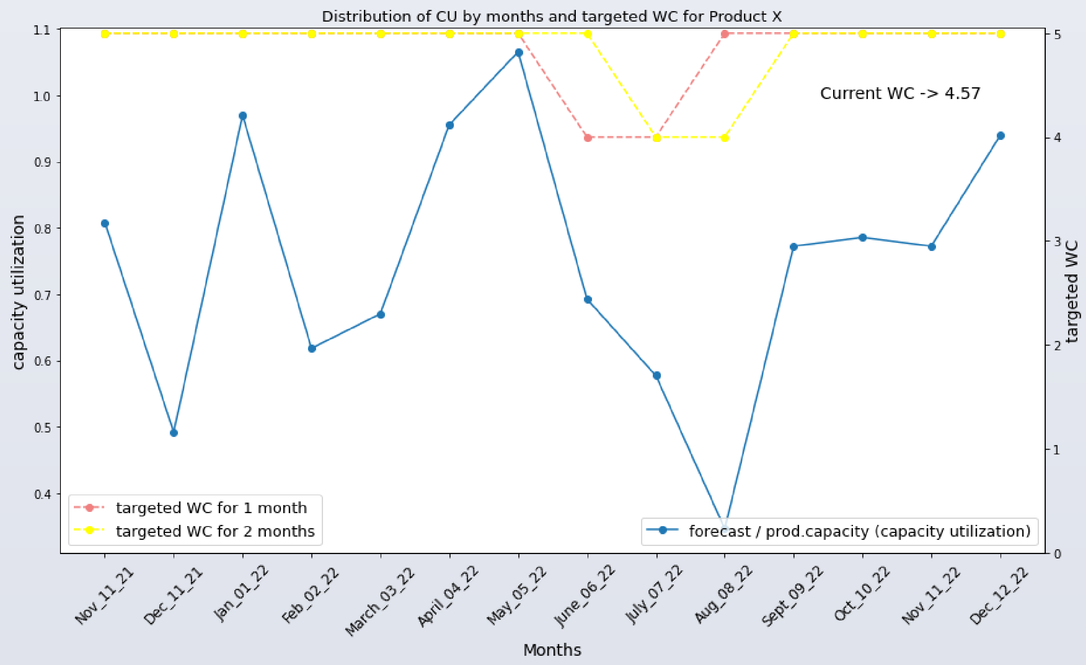
Calculating the Targeted Weekly Cover (TWC) values

Targeted WC values are calculated depending on the capacity utilization values which then would help us to determine the inventory level to keep in the inventory of Brisa in order not to lose sales or do backorder. This way Brisa can reach the targeted WC values in inventory levels through planning the production accordingly. The fluctuation of TWC values puts a burden on the production. That's why, we have done smoothing to prevent the TWC values from fluctuating. In the algorithm code the user can decide on the targeted WC values, CU intervals, maximum 1or 2-months weights of the CU values, and the production group preference. The algorithm implemented in Python can be seen at Figure 2. Similarly, below at Figure 3 the CU and TWC values can be seen.

Data visualization and analysis in Power BI

We used Power BI to create more dynamic, meaningful and logical charts and graphs to understand and conceptualize the outputs to generate reports which will be essential for the company while making decisions. The dashboard we have made shows KPI measurements for the company such as demand forecast accuracy, inventory turnover ratio, sales to stock ratio, deviation between WC and target WC and the relation between real inventory quantities to its respective WC value.

Figure 3 PSR Distribution of CU and TWC Values



CONCLUSION

With this project, we reach our goal which is to come up with an optimal inventory policy for each SKU which shows Brisa how much they should stock. Our approach and our work leads to a way that makes it easier to manage inventory because based on our work, now Brisa can easily determine the inventory levels for the SKUs and also they can see the BI, WC, Targeted WC and Capacity Utilization values accordingly. We have come up with an algorithm that tells whether the current inventory levels exceed or fall short of the needed inventory. The project is successfully completed and the algorithm is becoming part of Brisa's inventory management process. The company is satisfied with our work and they will continue to use our work to manage their inventory levels.

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