Managing inventory of solar panels considering demand growth and the risk of obsolescence

Managing inventories is a balancing act. On one hand you never want to run out of products to sell, in order to have happy customers. But on the other hand, keeping too much in stock is costly. It is especially difficult when it comes to products which frequently get succeeded by newer models, which is the case for solar panels. With the use of a mathematical model, we present a way to approach this problem.

Let's first examine an everyday problem highlighting the need for inventory control.

How much milk should we buy this week? This problem might seem like a simple problem to solve, same as last week right? Your household should consume the same amount of milk the upcoming week as the last week.

What if your children bring home more friends than usual after school? Then the usual amount of milk will certainly not be enough to last until next week. But if you buy enough milk to make sure that it will be more than enough, what happens if they stay over at their friends place instead? A lot of milk would then go bad before it all is consumed and we do not want to throw out milk!

Now Imagine that the milk has to be ordered months in advance from when it will be consumed. Your children have brought more and more friends over, consuming a larger and larger amount of milk each week. It has hence become increasingly more difficult to determine how much milk should be ordered to make sure it is enough while at the same time not having a lot of milk go bad.

The report addresses a common problem which occurs in everyday life but on an industrial scale and from the perspective of a solar panel solutions provider. The milk is solar panels, the household is the company and the children's friends are customers.

The company applied a manual control of the inventory of solar panels and found their stock on hand growing disproportionately in relation to the growth in demand. The increased demand in combination with long lead times from their supplier and the frequently updated solar panels made manual control of the inventory difficult.

An analytical model replacing the manual inventory control was created largely based on the theory presented in a textbook by Axsäter (2015), an authority within the area of inventory control. This model answers the questions

1. When should a replenishment order be triggered?
2. How large should this replenishment order be, i.e. what is the order quantity?

With the analytical model designed, how do we know it will perform well at the company? By simulating the environment of the company we saw that our model performs well in terms of avoiding “the milk going bad” as well as coming close to the desired service level. The model is relatively insensitive to changes in input parameters, with the exception of the supplier lead time, and the extent of advance information regarding the future need for solar panels.

The model is adapted to the specific company setting but could probably be used to control inventories under similar circumstances.

Reference:

Axsäter, S., 2015. Inventory control, International Series in Operations Research & Management Science. Springer Science+Business Media, New York, NY.