

A Data-Driven Demand Planning Framework for Inventory Management in Textile Industry

Raha Akhavan Tabatabaei, Burak Gökgür, and Reza Valimoradi

Full Professor of Operations Management & Business Analytics, Assistant Professor of
Operations Management & Business Analytics, M.Sc. Student in Business Analytics

Faculty of Management

Sabancı University

Orhanli, Tuzla, Istanbul, Turkey

akhavan@sabanciuniv.edu, bgokgur@sabanciuniv.edu, valimoradi@sabanciuniv.edu

Abstract

Demand forecast is the most essential input of the inventory models. In the case of manufacturing processes with a variety of similar products that can use a shared production line and common resources, the total amount of inventory and the itemized inventory levels need to be determined separately, but considering the correlation caused by the shared resources, we propose a framework that calculates the total required inventory levels based on the previous sales and demand forecasts and then determines the maximum amount of a production to be inventoried as a function of each product's forecast, and its previous sales for the period of the inventory. After deriving the max ratio to produce for each product, we propose clustering the products based on this ratio, to facilitate the application in industry. Using these ratios and the forecasts, the amount that need to be produced for each product is calculated. Then a new ratio for each product is calculated by dividing the amount of product to the required inventory for that product. Then the extra capacity is used so lowest ratio will become as high as possible. In our case study, we applied the framework to a tire cord fabric manufacturer, and after implementation they reported a total inventory decrease from 20 days of service to 10.

Keywords

Inventory Management, Finished Goods Inventory, Data-Driven Inventory Management, Textile Industry, product clustering.

Biographies

Raha A Tabatabaei, Ph.D., is currently a Full Professor of Full Professor of Operations Management & Business Analytics at the faculty of management at Sabancı University. She also served as the Senior Industrial Engineer, Intel Corporation, Arizona, USA. 2006-2009. She holds an undergraduate degree in Industrial Engineering from Sharif University of Technology, Iran, a Master's in Industrial and Systems Engineering - Operations Research (co-major), North Carolina State University, USA, and a Ph.D. degree in Industrial and Systems Engineering, North Carolina State University. Before joining Sabancı she worked as Associate professor of Operations Research, Department of Industrial Engineering, Universidad de los Andes, Bogota, Colombia for 2 years and as Assistant professor of Operations Research at the same department for 5 years. She has published numerous papers in prestigious journals such as Annals of Operations Research, European Journal of Operations Research, Transportation Science, Reliability Engineering & System Safety, and Computers & Industrial Engineering.

Burak Gökgür, Ph.D. received his BSc in Industrial Systems Engineering and his M.Sc. in Intelligent Production Systems Engineering from Izmir University of Economics, Izmir, Turkey in 2010 and 2013 respectively, and his Ph.D. in Operations Management and Information Systems from Koç University, Turkey in 2018. He has been working as an Assistant professor of Operations Management at Sabancı University since 2018.

Reza Valimoradi is a second year M.Sc. Business Analytics student at Sabancı University, Turkey. Prior to that he studied M.Sc. Business Administration and B.Sc. Chemical Engineering at Sharif University of Technology, Tehran, Iran.