Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/GC03.20260068
Published: February 2, 2026

Enhancing Forecast Accuracy in the Automotive Industry: A Comparative Study

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Abstract

Forecasting plays a critical role in organisational decision-making, especially within supply chains for production planning, procurement, and inventory management. Inaccurate forecasts, which can deviate by 20–50%, contribute to global supply chain waste estimated at USD 1.1 trillion annually. The automotive industry is particularly vulnerable due to its long lead times, capital intensity, and complex supplier networks. Studies reveal that one-third of forecasts contain errors up to 30%, with some deviating by as much as 90%, often leading to inefficiencies, excess inventory, or shortages. Toyota's downward production revision for 2024 illustrates how disruptions can quickly invalidate forecasts. In Singapore, the rapid rise of electric vehicles (EVs) and shifts in brand performance, such as BYD surpassing Toyota in early 2025, highlight the limitations of models relying solely on historical data. These changes reinforce the need for agile forecasting systems. This study considers forecast accuracy evident in the automobile industry and investigates the root cause of these inaccuracies. Then, it evaluates both traditional forecasting approaches (moving averages, exponential smoothing, and regression) to enhance forecast accuracy for some large automobile manufacturers, using publicly available data. We measure the accuracy based on forecast errors, mean absolute deviation (MAD), mean absolute percentage error (MAPE), and tracking signal (TS). Finally, we consider a simulation-based forecasting method to see whether higher forecasting accuracy can be achieved.

Keywords
Forecasting, Automotive industry, Forecast accuracy, Demand planning, Supply Chain.

Biographies
Leow Si Ting is an undergraduate student in the School of Business at the Singapore University of Social Sciences, majoring in the Supply Chain Management programme. This work is part of her final-year capstone project.

Sugoutam Ghosh is a Senior Lecturer and head of the Graduate Diploma in Logistics and Supply Chain Management at the School of Business at Singapore University of Social Sciences. His key research area is inventory management and supply chain risk management. His research has been published in reputed journals like POM and EJOR. Their article received Best Track Paper in Logistics at the 2nd Australian Conference on Industrial Engineering and Operations Management in 2023. He delivered keynote speeches at conferences in India and Indonesia. Dr Ghosh

teaches courses on Operations Management, Inventory Management, Optimisation, and Simulation. He has designed and delivered executive training programmes on Supply Chain Planning and Supply Chain Risk Management. He has been honoured with the Outstanding Service Award by the IEOM Society.