

Integrated Supply Chain Planning for SMEs: Design and Optimization of a Quantitative Framework- a case Study of EuroSys

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Abstract

Small and medium-sized enterprises frequently face significant barriers to integrated supply chain planning due to limited planning resources, fragmented data, and the absence of dedicated advanced planning systems. In practice, tactical planning is often done in spreadsheets and local data repositories, which strongly limits integration across demand, inventory, and capacity decisions and increases the tendency toward reactive “firefighting” behaviors. This graduation project rises to this challenge by providing a feasible, quantitative Integrated Supply Chain Planning framework for SMEs and tailoring it to EuroSys for Metal Industries (EuroSys), a project-driven manufacturing and installation company with high irregularity in customer demand, with binding procurement and capacity constraints. Iterative engagements with company stakeholders and a structured synthesis of the literature define the planning problem that combines into one chain four domains: (i) demand characterization and forecasting, (ii) inventory policy design under uncertainty, (iii) feasibility assessment under rough-cut supplier and capacity constraints, and (iv) scenario-based S&OP reconciliation. The main deliverable of this study is a dataset-driven methodology workflow specifying required inputs, logical decisions, and actionable outputs, including policy parameters, feasibility indicators, and scenario comparisons, and designed to be tool-independent and implementable under typical SME conditions. This work aims at setting a validated foundation for a lightweight decision-support prototype and its subsequent empirical evaluation.

Keywords

integrated supply chain planning; SMEs, demand forecasting, inventory policy, rough-cut capacity planning (RCCP), sales and operations planning (S&OP), scenario analysis.

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Biographies

Ali Allahverdi is a renowned scholar in the fields of Industrial Engineering and Operations Research, currently Professor at Gazi University (since May 2023). He holds a B.S. in Petroleum Engineering from Istanbul Technical

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Ahmed Habbabeh is an Industrial Engineering student at Gazi University (August 2026), and is also pursuing an MIT MicroMasters in SCM. he has expertise in the areas Operations, Lean, His capstone project is an integrated quantitative supply chain planning for SMEs. He applies cognitive architecture and data integrity to design high efficiency, systemic business solutions.