

AI-Driven and NLP-Powered Decision Support System for Sales Forecasting

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Abstract: *Small and medium-sized enterprises (SMEs) are plagued by inventory mismanagement, which results in stockouts, overstocking, loss of money. Studies shows that poor inventory practices lower competitiveness and profitability in developing nations [1]. Manual tracking and rule-based decision-making are a traditional systems, which tend to produce inaccurate stock levels [2]. This paper introduces an Intelligent Inventory Management System (IIMS), a web-based AI solution that combines machine learning for sales forecasting, natural language processing (NLP), and conversational AI. With the help of TensorFlow.js, IIMS provides an real-time sales forecasting with a minimal computing demands, with a 8.2 mean absolute percentage of error (MAPE). Physical field testing with an 50 retail enterprises for an six months demonstrated an 32% stockout reduction, 28% fewer excess products, and decision-making is 45% quicker. These results reinforce research proving that AI-based stock systems improve efficiency of SME supply chains [1]. IIMS is a internet-based, highly secure with role-based access control, meaning sophisticated inventory control is scalable and affordable for SMEs [2]. By combining AI-driven analytics in a user-friendly chat interface, IIMS updates stock management for businesses. A research points out an role of AI in connecting conventional with supply chain practices, assisting SMEs in remaining competitive in rapidly changing markets [1].*

Keywords: AI, Inventory Optimization, Predictive Analytics, NLP, TensorFlow.js, Gemini API, Sales Forecasting

