



System and Method of Integrated Generative Modeling Framework for Supply Chain Finance Risk Management

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Registered Patent Region	Patent/ Filing No.	Description	Issued/ Filing Date	Status
US	63/812,254	System and Method of Integrated Generative Modeling Framework for Supply Chain Finance Risk Management	27 May 2025	Pending

Stage of Technology Transfer: Commercially Viable Technology/ Product Ready for Sale
Research Area: Credit Risk Management for Supply Chain Finance

Abstract

A novel computer-implemented framework for risk assessment and loan sizing in third-party logistics (3PL)-led supply chain finance (SCF) for cross-border e-commerce (CBEC) small and medium-sized enterprises (SMEs) is proposed. The framework addresses limitations in traditional credit risk models by integrating Quantile-Regression-based Generative Metamodeling with Deep Factorization Machines (QRGMM†) to model conditional sales distributions. It formulates unified credit risk measures as functions of loan levels, enabling adaptive loan sizing based on projected sales and in-transit inventory collateral. By leveraging real-time logistics and e-commerce platform data, the system enhances risk management through precise estimation of multiple risk measures, improving financing decisions for SMEs in complex CBEC SCF scenarios.