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AI-Augmented Project Risk Management: Lowering the Experiential Barrier through Large Language Models

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Abstract

Project risk management in VUCA (volatility, uncertainty, complexity, and ambiguity) environments requires a dual capability: experiential expert judgment and rigorous probabilistic reasoning. However, this capability typically develops only through years of professional practice, creating an experiential knowledge barrier that constrains the scalability of rigorous risk management across the broader practitioner population. Large language models (LLMs) offer a novel mechanism for reducing this barrier by serving as externalized experiential memory. They can synthesize cross-industry risk patterns, historical analogies, and analytical procedures into structured guidance that is accessible to early-career practitioners. Building on this premise, this study frames the experiential knowledge barrier as both a scalability and democratization challenge, develops a conceptual framework for AI-augmented risk analytics, and presents an interactive learning-by-doing pedagogical case study of LLM integration in an undergraduate project risk management course. The proposed framework pairs LLM-elicited qualitative reasoning with dedicated probabilistic engines for quantitative inference. Empirical evidence is drawn from two complementary surveys: a course survey (n = 27), in which 74% of students rated the AI-augmented learning experience as Excellent or Very Good with no negative responses, and a parallel cross-sectional survey (n = 72), which indicates that students support embedding AI into required coursework while already engaging in critical evaluation of AI outputs. The paper concludes that AI-assisted decision support can provide a practical mechanism for scaling rigorous risk management expertise, provided that LLMs are used as analytical scaffolds rather than autonomous decision systems.

Keywords: *Project risk management; Large language models (LLMs); AI-augmented analytics; risk identification; AI-enhanced education.*

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