Chapter 7
AI-Driven Risk Sensing and Anomaly Detection for Predictive Project Management:
Designing Early Warning Systems to Enhance Resilience and Decision-Making

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DOI: 10.4018/979-8-3373-6851-1.ch007

ABSTRACT

The objective of this chapter is to propose a modernized framework for IT project management that addresses the shortcomings of traditional methodologies. It will argue for a shift from rigid, reactive models to an adaptive, proactive approach. The chapter demonstrates how integrating real-time data analytics and continuous risk monitoring can enhance flexibility, improve decision-making, and prevent the accumulation of unseen risks. Ultimately, it aims to outline the principles of a data-driven management strategy capable of delivering successful project outcomes in today's volatile technological landscape.

1. INTRODUCTION

Even now, many companies still use traditional project management methods, but these approaches are no longer effective in today's fast-changing and data-driven world. With the rapid growth of data from sources like IoT devices, sensors, and event logs, project teams can now monitor how projects progress in real time. When this data is properly analysed, it can provide useful insights that help managers make smarter decisions. Predictive Project Analytics (PPA) uses both past and current project data to detect potential issues early and suggest corrective or preventive actions before they turn into major problems (Mullapudi, 2025).

Despite this, many organisations are still applying classical project management techniques, yet these are no longer efficient in the fast-paced and data-driven world of today. Traditional approaches such as the Waterfall paradigm risk excluding a certain layer of complexity as they rely on fixed plans and physical synchronous monitoring, making it difficult to assess a threat timely manner or even make fundamental changes whenever that need arises. The problem occurs in traditional risk management after problems take place, so which is why many projects face issues like cost overruns, time delays and hence the outcome is poor quality. Therefore, organisations are now using data-centric tasks and predictive methods backed by new technologies like Artificial Intelligence (AI), Machine Learning (ML), and Big Data Analytics. These technologies benefit project managers by helping them to analyse large information with the assistance of sensors, Internet of Things (IoT) devices, and operating systems, which in turn aids in detecting risks beforehand, leading to more efficiency.

The main purpose of predictive project analytics (PPA), is to find the hidden patterns, identify possible risks and recommend how to avoid problems before they occur. So, it uses both past and present data to look ahead to future issues and suggest methods to reduce or avoid them. This system includes four major types

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Manuel B. Garcia, Joanna Rosak-Szyrocka, Ramazan Ylmaz, Ahmed Hosny Saleh Metwally, Dharel P. Acut, Kingsley Ofosu-Ampong, Fatih Erdodu, Chorng Yuan Fungand Aras Bozkurt (2025). *Pitfalls of AI Integration in Education: Skill Obsolescence, Misuse, and Bias (pp. 1-24).*
www.irma-international.org/chapter/rethinking-educational-assessment-in-the-age-of-generative-ai/379657