

## Navigating Complexity in Project-Based Organizations: Artificial Intelligence as a Systemic Driver of Managerial Decision-Making

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### Abstract

Contemporary projects increasingly operate as complex adaptive systems in which volatility, interdependence, uncertainty, and multiple stakeholder interests challenge conventional planning and control approaches. This study examines how artificial intelligence (AI) reconfigures complexity in project management and reshapes managerial decision-making, governance, and leadership. A qualitative meta-aggregative synthesis was conducted following PRISMA and Joanna Briggs Institute guidelines. The evidence base comprised 77 peer-reviewed studies on project complexity and a complementary corpus of 41 studies on AI-supported managerial decisions published between 2020 and 2025. The findings identify four cumulative conceptual generations and five interrelated dimensions of complexity: structural, dynamic, systemic, cognitive, and sociopolitical. Complexity emerges primarily from the interaction of uncertainty, interdependence, and volatility rather than from isolated technical difficulties. AI reduces first-order uncertainty by expanding data-processing, forecasting, and risk-analysis capabilities; however, it simultaneously creates second-order uncertainty associated with algorithmic opacity, bias, explainability, accountability, and shifts in organizational power. Consequently, AI should be understood not merely as an efficiency tool but as an endogenous systemic agent that transforms project governance and managerial authority. The study proposes that effective leadership in complex project environments requires hybrid intelligence, adaptive governance, collective sensemaking, organizational learning, and critical algorithmic literacy. These capabilities enable managers to balance analytical automation with contextual judgment, ethical responsibility, and continuous adaptation.

**Keywords:** adaptive governance; algorithmic accountability; hybrid intelligence; organizational learning; sociotechnical systems