

A Framework for Quantum-Enhanced Decision-Making in Complex Management Ecosystems

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Abstract. In the face of increasing complexity and uncertainty in global management landscapes, this paper introduces a novel framework leveraging quantum computing principles to enhance decision-making processes. By integrating quantum algorithms with traditional management theories, we propose a method for optimizing resource allocation and risk assessment. Through simulation studies and real-world applications, our findings demonstrate significant improvements in decision accuracy and efficiency. This research not only paves the way for future investigations into quantum management solutions but also offers practical implications for organizations seeking to navigate the intricacies of contemporary business environments.

Keywords: Quantum Decision-Making, Management Frameworks, Complex Systems, Resource Allocation, Risk Assessment, Advanced Algorithms, Computational Management, Digital Transformation, Sustainable Business Practices

Introduction

The 21st century has ushered in an era marked by unprecedented complexity within management ecosystems, necessitating innovative methodologies to confront challenges arising from rapid technological advancements and shifting market dynamics. As organizations grapple with multifaceted issues such as globalization, digital transformation, and sustainability, conventional decision-making frameworks often prove inadequate. The reliance on traditional models may lead to suboptimal outcomes, particularly in contexts characterized by high uncertainty and volatilities. This paper argues for the urgency of adopting advanced computational methods, particularly those inspired by quantum mechanics, which hold the potential to revolutionize management practices. Quantum

computing offers unique capabilities such as superposition and entanglement, which can be harnessed to develop sophisticated decision-making tools that surpass the limitations of classical approaches. Our research aims to elucidate the efficacy of a quantum-enhanced decision-making framework, providing empirical evidence of its capabilities in optimizing strategies across diverse management scenarios. We adopt a mixed-methods approach, combining theoretical modeling with empirical validation through case studies. The structure of this paper is outlined as follows: First, we review the prevailing literature on decision-making processes and the emerging role of quantum computing in this domain. Next, we present our proposed framework, detailing its operational mechanics and potential applications. Subsequently, we discuss the results from our simulations and case studies, highlighting the implications for management practice. Finally, we conclude with recommendations for future research avenues in quantum management.

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