Chapter 10
Using Quantum Computing for Digital Innovations in Hospitality

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ABSTRACT

This chapter investigates how quantum computing can revolutionize the hospitality industry in numerous ways, from improving operational effectiveness to providing individualized visitor experiences. Hotels may give hyper-personalized services based on customer partialities using quantum algorithms to analyze enormous volumes of data in real time. With advanced predictive analytics and decision-making techniques, quantum computing may significantly improve energy optimization, revenue management, and supply chain management. The chapter discusses the difficulties of using quantum computing in the hospitality industry, recent improvements, and uses. It highlights how early quantum technology adoption can give

DOI: 10.4018/979-8-3373-2053-3.ch010

progressive hospitality companies a competitive advantage, opening the door for new operational invention and service excellence standards. Ultimately, the chapter emphasizes how essential quantum computing will be in influencing the hospitality sector's future and bringing about digital transforms that meet the changing needs of a technologically advanced customer base.

INTRODUCTION

Quantum computing, a frontier in computational science, is poised to revolutionize the hospitality industry by offering unparalleled computational power and efficiency (Khakhanova et al., 2022). As the hospitality sector evolves, driven by increasing consumer expectations and technological advancements, the integration of quantum computing emerges as a game-changer (Yadav et al., 2024). Unlike classical computers, which process information in binary states (0s and 1s), quantum computers operate on quantum bits or qubits, which can exist in multiple states simultaneously (Kadowaki, 2024). This capability enables quantum computers to perform complex calculations at unprecedented speeds, solving problems that are currently intractable for classical systems (García-Molina et al., 2024). The advent of quantum computing presents a transformative opportunity for the hospitality industry, which relies heavily on data-driven decision-making and personalised customer experiences (Chissom, 2024). The hospitality industry is inherently dynamic, constantly shifting customer preferences and market trends. To remain competitive, businesses must adapt quickly, offering personalised experiences that cater to individual preferences and needs. Traditional data processing methods, while effective, are increasingly insufficient in handling the vast amounts of data generated daily by customers, suppliers, and internal operations (Tancara & Albarrán-Arriagada, 2024). This is where quantum computing comes into play. By leveraging quantum algorithms, hospitality businesses can analyse and interpret massive datasets in real-time, leading to more accurate and timely insights (Dutt et al., 2023). For instance, hotels can utilise quantum computing to predict guest preferences based on past behaviour, allowing them to offer highly personalised services that enhance customer satisfaction and loyalty.

Moreover, quantum computing can significantly impact the hospitality sector's revenue management and pricing strategies. Revenue management is crucial to hospitality operations, where businesses must strike a balance between supply and demand to maximise profitability (Ndhlovu, Dube, & Kifworo, 2024). Current models, although sophisticated, often struggle with the complexity of real-time data processing and the vast number of variables involved. Quantum computing can revolutionise this process by simultaneously processing multiple scenarios