


Chapter 8

Role of Emerging Technologies Like Blockchain and IoT in Business Intelligence

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ABSTRACT

This chapter explores the transformative impact of emerging technologies—specifically Blockchain and the Internet of Things (IoT)—on the evolving landscape of Business Intelligence (BI). As organizations increasingly depend on real-time data for strategic decision-making, the convergence of these technologies with BI is enabling a shift from static, historical reporting to dynamic, predictive, and autonomous analytics. The chapter begins by outlining the architecture of modern BI systems and the role of IoT in enhancing operational intelligence through continuous data streams from connected devices. It further examines how Blockchain ensures data integrity, transparency, and trust within multi-stakeholder environments, while enabling automation through smart contracts. By integrating AI and machine learning, BI systems can process IoT data and Blockchain records to deliver deeper insights and autonomous actions. The chapter presents cross-sector case studies, identifies key implementation challenges such as scalability and interoperability, and offers mitigation strategies.

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INTRODUCTION TO MODERN BUSINESS INTELLIGENCE ARCHITECTURE

Business Intelligence has undergone a remarkable transformation, evolving from its origins in static, retrospective reporting and descriptive analytics into a highly dynamic, real-time ecosystem that supports agile, data-driven decision-making across all levels of an organization. Traditional BI systems were largely focused on generating periodic reports from structured databases, often relying on IT departments to deliver insights to business users. In contrast, modern BI architecture is designed for immediacy, scalability, and adaptability, allowing decision-makers to access up-to-the-minute data and respond swiftly to changes in the business environment (Adewumi et al. 2024).

At the core of this architecture are several interlinked components: diverse data sources (ranging from transactional databases and CRM systems to external APIs and social media feeds), data integration and ETL (Extract, Transform, Load) tools, centralized repositories like data warehouses and data lakes, and sophisticated analytical engines capable of processing both structured and unstructured data. These are complemented by powerful visualization platforms that translate complex datasets into intuitive dashboards and interactive reports. Increasingly, cloud-based infrastructures serve as the foundation for BI systems, offering the elasticity, performance, and accessibility needed to handle growing volumes and velocities of data (Chintala, 2024).

A key hallmark of modern BI systems is their support for real-time analytics—critical for industries where speed and precision are vital, such as finance, healthcare, logistics, manufacturing, and e-commerce. Technologies like in-memory computing, stream processing, and real-time data pipelines enable continuous monitoring of key performance indicators, early detection of anomalies, proactive risk mitigation, and accurate forecasting. AI and machine learning are now integral to BI platforms, allowing for the automation of data discovery, pattern recognition, and the generation of predictive and prescriptive insights, which reduce reliance on human intervention and enhance strategic foresight (Suman, 2024).

Another paradigm shift is the rise of self-service BI, empowering end-users—such as marketing managers, operations analysts, and HR professionals—to directly access and analyze data without the need for advanced technical skills. Through intuitive, user-friendly interfaces powered by natural language queries and drag-and-drop functionalities, self-service BI democratizes data across the organization. This shift not only accelerates decision-making but also fosters a data-driven culture, where insights are more broadly shared and acted upon. However, the decentralization of analytics necessitates robust data governance frameworks to ensure accuracy,

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