Chapter 18
Sustainable Business Models: Role-Based Access Control (RBAC) Enhancing Security and User Management

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ABSTRACT

As the world increasingly grapples with environmental challenges, businesses are turning to data science and artificial intelligence (AI) to forge sustainable models that drive both economic and ecological benefits. This chapter explores the transformative potential of eco-analytics in reshaping traditional business practices. It delves into how organizations leverage advanced data analytics and AI-driven insights to optimize resource usage, reduce waste, and enhance decision-making processes. By examining various case studies across different industries, the chapter illustrates practical applications of eco-analytics that have led to measurable improvements in sustainability performance and operational efficiency. Furthermore, it discusses the ethical considerations and best practices for implementing data-driven sustainability strategies.

1. INTRODUCTION TO ECO-ANALYTICS

In an era defined by escalating environmental concerns, the intersection of technology and sustainability has become increasingly critical. Eco-analytics—a field that combines data science, artificial intelligence (AI), and sustainable business practices—emerges as a powerful approach for organizations aiming to reduce their ecological footprint while enhancing operational efficiency. This chapter aims to explore the role of eco-analytics in transforming business models and driving sustainable practices.

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1.1 Overview of Eco-Analytics

Eco-analytics refers to the application of advanced analytics, machine learning, and AI techniques to assess, monitor, and improve the sustainability of business operations. By harnessing vast amounts of environmental and operational data, organizations can identify inefficiencies, predict resource usage, and optimize their processes to minimize waste and emissions. This data-driven approach not only aids in regulatory compliance but also aligns with the growing consumer demand for sustainable practices.

The framework of eco-analytics encompasses various methodologies, including predictive analytics, big data analysis, and real-time monitoring systems, which provide actionable insights into sustainability efforts. As organizations increasingly recognize the importance of integrating sustainability into their core strategies, eco-analytics offers a roadmap for achieving measurable environmental impact while maintaining profitability.

The integration of Role-Based Access Control (RBAC) with sustainable business models has been a significant area of research in recent years, aiming to enhance security, scalability, and efficiency across various business sectors. Studies have emphasized the role of RBAC in securing enterprise systems, providing a security-centric approach for organizational sustainability (Anwar & Shaikh, 2021). Several researchers have explored how RBAC can be leveraged to enhance green IT practices, enabling sustainable business operations by reducing energy consumption and ensuring compliance with environmental regulations (Bhat & Lee, 2022; Kapoor & Sharma, 2021). Additionally, RBAC has been highlighted as a crucial component for securing e-commerce platforms and cloud-based business models, particularly in the context of digital transformation (Choi & Kim, 2021; Hameed & Khan, 2022). The role of RBAC in safeguarding business infrastructure has also been explored in various contexts, including IT management, cybersecurity, and cloud computing, demonstrating its versatility in modern digital ecosystems (Gupta & Soni, 2020; Jain & Patel, 2021; Kumar & Singh, 2022). Furthermore, RBAC is seen as a key enabler for secure data management and user access control in sustainable business models, with implications for both operational efficiency and compliance (Jadhav & Desai, 2020; Sharma & Agarwal, 2023). Recent advancements in RBAC frameworks highlight its potential to address emerging challenges in business security, particularly in the age of digitalization and the Internet of Things (IoT) (Lee & Park, 2020; Mishra & Verma, 2021). Moreover, scholars have examined the alignment of RBAC with various business strategies, showing its role in improving business value and competitive advantage through effective user management (Singh & Joshi, 2022; Whig et al., 2024). As businesses continue to adopt digital technologies, the importance of RBAC in sustainable business practices grows, ensuring secure, scalable, and efficient management of resources and user access (Hassan & Zhang, 2023; Whig, Sharma, & Modhugu, 2024).

1.2 The Importance of Data Science and AI in Sustainability

The integration of data science and AI into sustainability efforts represents a paradigm shift in how businesses operate. Data science enables organizations to analyze complex datasets and uncover patterns that inform decision-making processes. AI further enhances this capability by automating analyses, providing predictive insights, and enabling adaptive responses to changing conditions. Together, these technologies empower businesses to make informed choices that drive sustainability.

Key benefits of utilizing data science and AI in sustainability include: