

Chapter 12

Edge Computing and Marketing in the Smart Economy: Processing Consumer Data in Real-Time

Hamed Nozari

 <https://orcid.org/0000-0002-6500-6708>

Independent Researcher, Australia

Hossein Abdi

Department of Management, Islamic Azad University, Dubai, UAE

Khatere Rafiei

 <https://orcid.org/0009-0005-4471-6929>

Department of Management, Islamic Azad University, Dubai, UAE

ABSTRACT

Edge computing is revolutionizing marketing by enabling real-time data processing, enhancing personalization, and improving customer engagement. Unlike traditional cloud-based systems, edge computing processes data closer to its source, reducing latency and optimizing marketing strategies. This research explores the role of edge computing in marketing, its key applications, advantages, challenges, and future potential. By integrating AI, IoT, and 5G, businesses can create dynamic, data-driven marketing ecosystems that offer hyper-personalized experiences while ensuring data security and efficiency in the evolving digital economy.

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1- INTRODUCTION

The digital economy is undergoing rapid transformation, driven by advancements in data processing, artificial intelligence, and real-time consumer engagement. As businesses strive to create more dynamic, personalized, and efficient marketing strategies, the need for faster and more localized data processing has become critical. Traditional cloud-based computing, while instrumental in scaling digital marketing efforts, often introduces latency, bandwidth congestion, and privacy concerns that hinder the real-time responsiveness required for modern customer interactions. In response to these challenges, edge computing has emerged as a revolutionary approach, offering decentralized data processing that enhances marketing agility, personalization, and consumer engagement (Fallah & nozari, 2021).

Edge computing refers to the practice of processing data closer to its source—on IoT devices, mobile networks, and local servers—rather than relying on centralized cloud infrastructure. By enabling instantaneous data analysis and decision-making, edge computing allows businesses to respond to customer behaviors in real-time, significantly enhancing the effectiveness of digital marketing strategies. Whether through AI-powered chatbots, personalized recommendations, location-based advertising, or real-time sentiment analysis, edge computing empowers brands to create seamless and highly engaging customer experiences. As marketing evolves into a more dynamic, data-driven discipline, the ability to act on consumer insights instantaneously is no longer a competitive advantage but a fundamental necessity (Anozie et al., 2024).

The integration of edge computing in marketing is particularly crucial in an era where customer expectations are at an all-time high. Consumers now demand instant recommendations, tailored promotions, and personalized interactions, all of which require real-time processing capabilities that traditional cloud computing struggles to deliver efficiently. In industries such as retail, e-commerce, and digital advertising, edge computing is already proving to be a game-changer, allowing brands to optimize their marketing campaigns in real-time while minimizing costs associated with data transfer and cloud storage.

Despite its advantages, the adoption of edge computing also presents challenges, including high infrastructure costs, security risks, and the complexity of managing decentralized data networks. As businesses shift toward this new era of real-time marketing, it is essential to understand the role, impact, and future potential of edge computing in shaping more intelligent, efficient, and customer-centric marketing strategies. This research delves into the evolution of edge computing in marketing, examining its key applications, benefits, challenges, and future trends, with a focus on how businesses can leverage this technology to create next-generation marketing experiences that are faster, smarter, and more engaging.

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