

Exploring Consumer Sentiment in the Online Pharmacy Ecosystem

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ABSTRACT

Using 11,551 user reviews from four platforms—Long Châu, Pharmacity, An Khang, and Medigo—this study employs natural language processing and sentiment analysis techniques to classify consumer opinions and explore the factors influencing their perceptions. The findings reveal that Vietnamese consumers generally hold favorable attitudes toward the convenience and accessibility of mobile ordering services. Nonetheless, persistent concerns remain regarding delivery timeliness, consultation responsiveness, and the technical stability of applications. This study contributes empirical evidence to the growing body of research on digital pharmacy ecosystems in emerging markets. The results have practical implications for app developers and pharmacy managers seeking to optimize user experience and foster consumer trust. Moreover, they offer valuable guidance to policymakers on designing regulatory frameworks that promote transparency, quality assurance, and patient safety in Vietnam’s evolving digital healthcare landscape.

KEYWORDS

Online Pharmacy, Mobile Application, CH Play, Sentiment Analysis, B2C E-Commerce, Python

INTRODUCTION

The global pharmaceutical sector represents one of the most dynamic and high-value components of modern healthcare systems, encompassing the research, development, manufacturing, and distribution of medicines and healthcare products. Its continued expansion is driven by rising healthcare demand, population aging, and advances in biotechnology and personalized medicine (Ashrafi et al., 2025; Ranchon et al., 2023). Alongside these developments, the rapid digital transformation of healthcare services has facilitated the emergence of online pharmacies as an important element of the broader digital health ecosystem. Through e-commerce technologies and telemedicine services, online pharmacies provide citizens with more convenient and accessible channels for obtaining medications, healthcare information, and consultation services (Chen & Guo, 2026; Srivastava & Raina, 2021). Across major regions such as the United States, Europe, and increasingly Asia, the growth of online pharmacy services has been supported by improvements in digital infrastructure,

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logistics systems, and electronic payment technologies (Chen & Guo, 2026). From a digital governance perspective, online pharmacy platforms function as interconnected service networks linking multiple stakeholders, including patients, healthcare providers, pharmaceutical companies, and regulatory authorities (Ahalawat et al., 2024; Almeman, 2024; Osorio Gonnet et al., 2025; Srivastava & Raina, 2021). These platforms facilitate services such as remote consultations, electronic prescriptions, medication delivery, and digital health monitoring, thereby enhancing the accessibility and efficiency of services within contemporary healthcare systems (Ashrafi et al., 2025; Khan et al., 2025; Uncovska et al., 2023; Yang et al., 2025). As governments increasingly promote digital transformation in public services, understanding how users experience and evaluate these digital health platforms has become essential for improving service quality and strengthening public trust in digital healthcare delivery (Osorio Gonnet et al., 2025; Yojana, 2025).

Vietnam has experienced a rapid expansion of online pharmacy services as part of its broader digital transformation in healthcare. Increasing internet penetration, widespread smartphone adoption, and the growing use of digital payment systems have created favorable conditions for consumers to access pharmaceutical products through online platforms (Ho et al., 2025). In response to these developments, major pharmacy chains such as Pharmacity, Long Châu, and Medigo have introduced business-to-consumer (B2C) mobile applications and websites that allow users to purchase medications, consult pharmacists remotely, and receive home delivery services (Ho et al., 2025; Nguyen-Khanh et al., 2024). Existing research indicates that consumer trust and service reliability are critical determinants of satisfaction and continued use of digital pharmacy services in the Vietnamese market. As the government continues to promote digital transformation in the healthcare sector, online pharmacy platforms are expected to play an increasingly important role in improving access to pharmaceutical services—particularly for populations in remote or underserved areas—and in supporting the development of Vietnam’s digital health ecosystem (Nguyen et al., 2025; Nguyen-Khanh et al., 2024).

Digital transformation has significantly reshaped how citizens access healthcare services and purchase pharmaceutical products through online platforms. Users increasingly rely on online information sources such as reviews, price comparisons, and perceived trustworthiness to assess the quality and reliability of these services. Factors including product authenticity and the responsiveness of consultation services play important roles in shaping user perceptions (Srivastava & Raina, 2021). Prior research suggests that positive digital service experiences can strengthen user trust and encourage continued engagement with digital health platforms, whereas negative feedback may quickly undermine public confidence (Bhatt et al., 2024; Bottacin et al., 2025; Pinto et al., 2024). From a digital governance perspective, understanding citizen feedback has therefore become essential for improving the design and delivery of digital health services.

In recent years, sentiment analysis has emerged as an important analytical approach for examining user perceptions and satisfaction within B2C digital service environments, including online pharmacy platforms (Laghbi & Al Dhoayan, 2024; Liu et al., 2020; Nair et al., 2024; Annamalai et al., 2024). The growing availability of user-generated content, particularly online reviews, provides valuable data for assessing citizen experiences with digital healthcare services and identifying service quality challenges (Kumar et al., 2024). Several studies have applied sentiment analysis to online pharmacy reviews to uncover the key factors influencing user satisfaction and trust in digital pharmaceutical services. Collectively, these studies demonstrate that sentiment analysis can generate meaningful insights into user experiences and trust formation, offering valuable evidence for improving the governance and management of digital health services (Loo et al., 2021; Nguyen et al., 2023).

Although previous studies have demonstrated the usefulness of sentiment analysis for examining user experiences in online pharmacy and B2C retail environments, empirical evidence from emerging economies remains limited, particularly in Southeast Asia and Vietnam (Ho et al., 2025). Much of the existing literature has focused on markets with mature e-commerce infrastructures, such as the United States, China, and Western Europe, where online pharmacy services have achieved large-scale

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